DOCUMENT RESUME

ED 395 112 CE 070 927

AUTHOR Webster, Suzanne
TITLE Math Extra. Final Report.
INSTITUTION Central Intermediate Unit #10, Clearfield, PA. Development Center for Adults.
SPONS AGENCY Pennsylvania State Dept. of Education, Harrisburg. Bureau of Adult Basic and Literacy Education.
PUB DATE 95
CONTRACT 98-5018
NOTE 134p.
PUB TYPE Reports - Descriptive (141) -- Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Adult Basic Education; Curriculum Development; *Displaced Homemakers; *One Parent Family; *Problem Solving; *Remedial Mathematics; Underemployment; Unemployment; *Word Problems (Mathematics)
IDENTIFIERS 353 Project

ABSTRACT

A project adapted an existing problem-solving curriculum to help unemployed or underemployed displaced homemakers and single parents qualify for job placement and training. Forty-five adult learners from the New Choice program participated. Handouts adapted from a prior Math Employment project and instructor-created materials were used. Handouts from level 1 of the previous project were simplified even further. Instruction was supplemented with self-help groups. Findings indicated the following: 43 of 45 participants increased their math scores; 15 raised their scores 1-2 grade levels; and 28 raised their scores 3-5 grade levels using the Test of Adult Basic Education. Test scores from completion of teacher-generated word problems were substantially increased. Of the 45 participants, 28 entered training and 2 entered full-time employment. (Appendixes to the 11-page report include sample lesson plan, pretest, posttest, and participant survey form. The curriculum includes a chapter for each math concept. Chapter titles are as follows: introduction to word problems, English or standard U.S. measurement, perimeter and area, ratio and proportion, and percents. Each chapter has these components: objective, rationale, vocabulary, lesson methodology, handouts, and answer keys.) (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 395 112

FINAL REPORT

MATH EXTRA

by Suzanne Webster
Project Facilitator
CIU 10 Development Center for Adults
410 Shaw Street
Clearfield, PA 16830

Central Intermediate Unit 10
R. R. 1, Box 374
West Decatur, PA 16878

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

July 1, 1994 to June 30, 1995
PDE Project 98-5018 $4993

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

The activity which is the subject of this report was supported in part by the U.S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education or the Pennsylvania Department of Education, and no official endorsement by these agencies should be inferred.

CE070927

BEST COPY AVAILABLE

MATH EXTRA

TABLE OF CONTENTS

Abstract . . . . . Page 1

Introduction . . . . . Page 2

Problem and Objectives . . . . . Page 4

Evaluation . . . . . Page 7

Conclusion . . . . . Page 10

Appendices:

A. Sample Lesson Plan . . . . . Page 12

B. Sample Pre-test . . . . . Page 26

Sample Post-test . . . . . Page 34

C. Sample Participant Survey Form . . . . . Page 41

D. Bibliography . . . . . Page 43

ABSTRACT PAGE

Title: MATH EXTRA

Project No.: 98 - 5018 Funding: $4993

Project Director: Suzanne Webster Phone No.: (814) 765 - 1131

Contact Person: Suzanne Webster Phone No.: (814) 765 - 1131

Agency Address: Central Intermediate Unit # 10
RR 1, Box 374, West Decatur, PA 16878

Purpose:

MATH EXTRA adapted an existing word problem solving curriculum to help unemployed or underemployed displaced homemakers and single parents qualify for job placement and job training. Forty-five adult learners from the New Choices program participated.

Procedures:

Handouts adapted from the prior # 353 Math Employment project (1989-1990) and instructor-created materials were used. Instruction was supplemented with *Contemporary's Number Power 2, 3, and 4*. Stand up instruction was used along with self-help groups.

Summary of Findings:

Of the 45 participants, 43 increased their math scores; 15 raised their scores 1-2 grade levels, and 28 raised their scores 3-5 grade levels using the Test of Adult Basic Education. Test scores from the teacher-generated word problem solving assessment were substantially increased. Of the 45 participants, 28 entered training and 2 entered full-time employment.

Comments:

Only handouts from Level 1 of the existing Math Employment were used; and these handouts were simplified even further. The average test-in grade for MATH EXTRA was 8.6, lower than the average test-in grade of the existing Math Employment curriculum. Although word problem solving was the basis of the Math Employment curriculum, the emphasis of MATH EXTRA was on basic concepts, with word problem solving as a secondary enhancement.

Products:

Adapted curriculum, worksheets and materials were collected in notebook form.

Descriptors:

MATH EXTRA

INTRODUCTION

MATH EXTRA, adapted from a prior #353 MATH EMPLOYMENT project (1989-1990), was designed to address the problem of unemployed and underemployed single parents and displaced homemakers who plan to pursue continued education or job training programs, and who are deficient in math skills. The project resulted from a request by Clearfield New Choices (REACH) participants who were currently enrolled in training programs. They identified several math areas (ratio, proportion, percents, and measurement) and word problem solving as areas most difficult when taking entrance tests.

The curriculum was interfaced with the Clearfield County New Choices Program and was offered in three 18-hour workshops during the 1994-95 program year. The target audience was forty single parents and displaced homemakers, but forty-five adult learners actually participated. The workshops met six times for three-hour sessions over a four- to five-week period of time.

Suzanne Webster, who is also an ABE/GED instructor for the CIU 10 Development Center for Adults, was responsible for implementing the curriculum. She has a Bachelor of Science degree in Elementary Education from Clarion University.

Other support staff included Melanie Haley, Project Secretary, and Karen Wolfe, Project Bookkeeper.

The curriculum can be utilized by any adult literacy program by choosing the sections that meet the needs of their students, since each section is designed to be used independently of the others. Each section includes more materials than can be presented in a three-hour segment. Therefore, the instructor can adapt those materials he/she deems important and appropriate for his/her program. Also included in each section is a lesson methodology and examples for instruction. All exercises and worksheets were designed to be easily reproduced for student use.

The goal of MATH EXTRA was to maximize specific math skills of single parents and displaced homemakers before they take placement tests to enter continued education or job training.

The purpose of MATH EXTRA was to help single parents and displaced homemakers identify deficiencies which exist in their math skills and overcome some of their weaknesses.

Permanent copies of the curriculum and evaluation are on file with:

Bureau of Adult Basic and Literacy Education Programs
333 Market Street
Harrisburg, PA 17126-0333

AdvancE
PDE Resource Center
333 Market Street, 11th Floor
Harrisburg, PA 17126-0333

Western Pennsylvania Adult Literacy Resource Center
5347 William Flynn Hwy. (Rt. 8)
Gibsonia, PA 15044

PROBLEM AND OBJECTIVES

MATH EXTRA addresses the problems of unemployed and underemployed single parents and displaced homemakers who plan to pursue continued education or job training programs, and who are deficient in math skills. A specialized curriculum covering four major areas was adapted from the prior #353 Math Employment project (1989-1990) and piloted with single parents and displaced homemakers in Clearfield County.

MATH EXTRA met and /or exceeded all of its objectives:

OBJECTIVE 1: To adapt a math curriculum, utilizing a prior #353 Math Employment project (1989 - 1990), for use with unemployed or underemployed displaced homemakers and single parents in Clearfield County.

Four specific areas were designated and adapted as components of the curriculum: 1. measurement 2. perimeter and area 3. ratio and proportion 4. percents. Also included in the curriculum were steps for solving word problems and optional pre- and post-testing using word problems. These areas were chosen to address the majority's needs to enter health and nontraditional fields.

All lesson plans were designed to focus on specific objectives, offer a rationale, introduce necessary vocabulary, and advise the instructor in methodology. Practice exercises were incorporated to help students become comfortable with the computation necessary for understanding each concept and solving word problems.

While implementing the first workshop, the instructor discovered the need to spend substantial time covering the basic concepts of each component. Therefore, only handouts from Level 1 of the existing Math Employment curriculum were used; and these handouts were simplified even further.

A basic introduction to word problem solving was presented after the initial MATH EXTRA test-in; and word problem solving was presented with every component. An independent section is dedicated to the methodology needed to present word problem solving. Although it was not used as a separate workshop component, it was included to be used as a tool to enhance the utilization of the MATH EXTRA curriculum.

It should be noted that necessary remediation for fractions and decimals was covered in the ABE portion of the New Choices workshop prior to the implementation of MATH EXTRA.

OBJECTIVE 2: To raise participant math scores to a level necessary for qualifying for job placement and job training programs.

The TABE (Test of Adult Basic Education) Level D was used to assess the participants' math skills. Most test-in scores were on the seventh and eighth grade levels. All participants had a high school diploma or GED.

96 % of the participants raised their math scores during the 18-hour workshop. (See evaluation for data.)

OBJECTIVE 3: To pilot and evaluate adapted materials with forty adult New Choices participants.

The curriculum was adapted to pilot with forty adult learners in four, 18-hour workshops, but 45 adult learners were actually served in a series of three workshops. Because of the high number of learners studying for GED diplomas, the curriculum was not offered in the fourth New Choices workshop.

MATH EXTRA was enhanced with basic math skills instruction and English review, as well as aptitude testing and career counseling through New Choices.

EVALUATION

Evaluation of MATH EXTRA consisted of four areas: 1. success of the students to improve their scores by using TABE pre- and post-testing; 2. increased scores with the optional pre- and post-tests developed for the curriculum; 3. the responses and criticisms of participants concerning the curriculum by means of a survey form at the conclusion of the workshop; 4. the collection of follow-up data on each participant in relation to employment or training status.

1. Of the 45 who participated in MATH EXTRA pilot program:

7	participants elevated their math grades by one grade level
8	participants elevated their math grades by two grade levels
12	participants elevated their math grades by three grade levels
16	participants elevated their math grades by four or five grade levels
2	participants showed no grade elevation

2. The optional pre- and post-testing developed for MATH EXTRA offered participants the opportunity to test their skills by attempting the types of word problems that might appear on a training or entrance test for continued education.

The test consisted of 20 word problems with three bonus word problems available. In order to enhance self-esteem and encourage participants to attempt word problem solving, three bonus problems were added to the test, but were scored so that no credit would be lost if the bonus answer or answers were incorrect. However, correct bonus answers were added to the final grade. Thus, a perfect score was 115%.

Of the 45 who participated in the pre- and post-word problem solving testing:

PRE-TEST:	8	participants scored between	25 - 50%
	22	participants scored between	55 - 75%
	14	participants scored between	80 - 95%
	1	participants scored between	100 - 115%

PRE-TEST:	0	participants scored between	25 - 50%
	13	participants scored between	55 - 75%
	16	participants scored between	80 - 95%
	16	participants scored between	100 - 115%

3. At the conclusion of each workshop, participants were asked to complete a survey form which was created to elicit feedback about the workshop and curriculum. All 45 participants completed and returned a form. The results are as follows:

43	rated the curriculum excellent
2	rated the curriculum good
0	rated the curriculum fair
0	rated the curriculum poor

The area rated most beneficial by the participants was measurement, followed by percents, ratio and proportion, and perimeter and area. Other areas listed as beneficial were fractions and decimals, which were covered in the ABE portion of the New Choices workshop.

All but one participant felt word problem solving helped them to regain basic math skills; and that person noted that she never had a problem understanding word problems. All participants felt word problem solving would help them to more easily pass entrance tests for job training or continued education and enhance their job skills for employment.

Of those who gave recommendations on ways to improve the curriculum, most felt nothing should be changed and liked the step-by-step approach. Other comments suggested that use of calculators should be taught and that the curriculum needed to be more challenging.

4. In May of 1995, all forty-five participants were tracked through New Choices records for follow-up. The status of the participants follows:

2	were employed
28	were involved in training or continued education
5	are enrolled and will begin classes in the summer or fall of 1995

It should be noted that of those involved in training, 15 completed a computer course, six completed LPN training, 2 completed nurses aide training, and two entered a nontraditional classroom project. Of the five who are enrolled, four will enter trade/technical programs, one will enter LPN and one will enter CDL training. All of these participants indicated they would not have entered these training programs had they not had math remediation.

CONCLUSION

MATH EXTRA was successful in meeting its objectives and goals. The curriculum was adapted and utilized. The projected number of participants was exceeded and the responses from them were favorable.

It should be noted that many participants who came into the learning environment with a math anxiety, left the workshop with a desire to join ABE (Adult Basic Education) courses for additional study. Resistance to certain math areas was dispelled, and the use of grouping participants on similar levels helped bring down many math barriers. Sharing and working word problems in a nonthreatening, cooperative atmosphere allowed everyone to succeed by drawing upon each participant's strengths.

The follow-up data, collected at the end of the project (see "Evaluation"), speaks for itself and indicates the success of MATH EXTRA.

The only recommendations the project director might suggest are that a class size of 10-15 participants be maintained to establish a more comfortable learning environment where students can receive a larger share of the instructor's time; and that Introduction to Word Problems be offered as an additional component.

Because all the activities are written in exercise format and because each math concept constitutes a chapter, the curriculum lends itself well for subdivision and reproduction. Instructors can use all or parts of it, depending on the needs and desires of the participants being served.

We wish to thank the Division of Adult Basic and Literacy Education Programs for providing funding for this and other 353 Projects that assist in the development and expansion of services to our participants.

MATH EXTRA

Sample Lesson Plan

(Appendix A)

PERCENTS

OBJECTIVE:

To introduce a basic review of fractions and decimals as they relate to percents

RATIONALE:

Percents appear regularly in daily life and in math problems. Students may even want to know how their grades in class are determined. When 100 questions are used, percentage is easily determined. When more or less questions are asked, it becomes more difficult for students to compute the percentage grade of their tests or papers. Participants need to know the relationship between fractions and decimals, and their conversion to percents.

VOCABULARY:

percent	-	a part of a whole that is divided into one hundred parts
fraction	-	a piece of a whole; the group which includes mixed numbers, improper fractions and proper fractions
numerator	-	the top number in a fraction
denominator	-	the bottom number in a fraction
decimal	-	a number using base ten and containing a decimal point
%	-	a symbol that stands for percent

LESSON METHODOLOGY:

Introduce the word percent. Explain that the prefix, "per," means "each"; and the root word, "cent," comes from Latin and means "hundredth part."

Tell students that when figures must be compared, we use a percentage so that everyone can use the same common denominator. Percent is a common term in the everyday world. Interest, discounts, raises, paycheck deductions, and credit card charges are all figured with percents. 100 is a good base because it is found in fractions and decimals, and corresponds to the United States monetary system.

<u>CHANGING DECIMALS TO PERCENTS</u>

Decimals are easily converted to percents by simply moving the decimal point two places to the right and adding the percent symbol onto the end of the digits. If the point moves to the end of the number, it is not necessary to write the point. In a whole number, place the decimal point to the right of the number, then move two places to the right.

Examples:

Decimal		Move two places to the right		Percent
.025	=	.025	=	2.5%
5	=	500	=	500%
.36	=	.36	=	36%
8.4	=	8.40	=	840%

CHANGING FRACTIONS TO PERCENTS

Explain to students that all fractions can be changed to percents simply by changing the fraction to a decimal then changing the decimal to a percent.

To change a fraction to a decimal, first divide the numerator by the denominator.

Example: $\frac{3}{4}$ is the same as 3 *divided by* 4

$$\frac{3}{4} = 4\overline{)3.00} \quad .75$$

$$\begin{array}{r} 28 \\ \hline 20 \\ 20 \end{array}$$

The result of this division will be the decimal we need. As in the first example, to convert a decimal to a percent, move the decimal point two places to the right and add the percent symbol after the digits.

Answer: $\frac{3}{4} = .75 = .75 =$ **75%**

*Use Hand-out: "Percents - Practice 1"

Using hand-out, have the students convert the decimals and fractions to percents.

CHANGING PERCENTS TO DECIMALS

Percents are converted to decimals by dropping the percent symbol and moving the decimal point two places to the left. Add zeros when necessary to move the two places.

Examples:

Percent		Move two places to the left		Decimal
6%	=	.06	=	.06
15%	=	.15	=	.15
.06%	=	.0006	=	.0006
.9%	=	.009	=	.009
150%	=	1.50	=	1.50

CHANGING PERCENTS TO FRACTIONS

To change a percent to a fraction, write the percent as a fraction with 100 as the denominator.

METHOD 1
Examples:

Percent		Fraction		Reduced Fraction
75%	=	$\frac{75}{100}$	=	$\frac{3}{4}$
9%	=	$\frac{9}{100}$	=	$\frac{9}{100}$
20%	=	$\frac{20}{100}$	=	$\frac{1}{5}$

METHOD 2
Example:

$8\frac{1}{3}\%$ = $\frac{8\frac{1}{3}}{100}$ Write the percent as a fraction with 100 as the bottom number.

= $8\frac{1}{3} \div 100$ You can rewrite this fraction as a division problem.

$= \frac{25}{3} \div \frac{100}{1}$ Change the mixed number to an improper fraction.

$= \frac{25}{3} \times \frac{1}{100}$ Invert the divisor and multiply.

$= \frac{25}{300} = \frac{\mathbf{1}}{\mathbf{12}}$ Reduce.

*Use Hand-out: "Percents - Practice 2"

Using hand-out have the students convert the percents to decimals and fractions.

FINDING A PERCENT OF A NUMBER

To find a percent of a number, change the percent to a decimal or to a fraction and multiply.

Find 25% of 40.

METHOD 1
Example:

25% = .25 Change the percent to a decimal.

```
   40
 x .25
 2 00
 8 00
10. 00
```

Multiply.

Answer: **25% of 40 = 10**

METHOD 2
Example: $25\% = \frac{1}{4}$ Change the percent to a fraction.

$\frac{1}{4} \times \frac{40}{1}$ Change whole number to a fraction and multiply.

$= \frac{40}{4} = \frac{10}{1} = 10$ Reduce.

Answer: **25% of 40 = 10**

*Use Hand-out: "Percents - Practice 3"

Using hand-out, have the students find the percent of numbers.

*Use Hand-out: "Percents - Word Problems"

Using hand-out, have students work in groups to set up and solve word problems involving percents.

PERCENTS
PRACTICE 1

Change each decimal to a percent:

1. .065 =
2. .75 =
3. 1.5 =
4. .02 =
5. 80 =
6. .32 =
7. .005 =
8. .0016 =
9. .085 =
10. .09 =
11. .372 =
12. .65 =
13. 7 =
14. .0003 =
15. .6 =
16. .025 =

Change each fraction to a percent:

1. $\frac{2}{5}$ =
2. $\frac{6}{25}$ =
3. $\frac{9}{10}$ =
4. $\frac{1}{10}$ =
5. $\frac{5}{8}$ =
6. $\frac{4}{25}$ =
7. $\frac{9}{20}$ =
8. $\frac{3}{15}$ =
9. $\frac{1}{4}$ =
10. $\frac{7}{8}$ =
11. $\frac{4}{5}$ =
12. $\frac{3}{10}$ =
13. $\frac{3}{5}$ =
14. $\frac{5}{12}$ =
15. $\frac{20}{50}$ =
16. $\frac{4}{16}$ =

PERCENTS
PRACTICE 1
ANSWER SHEET

Change each decimal to a percent:

1.	.065	=	*6.5%*	9.	.085	=	*8.5%*
2.	.75	=	*75%*	10.	.09	=	*9%*
3.	1.5	=	*150%*	11.	.372	=	*37.2%*
4.	.02	=	*2%*	12.	.65	=	*65%*
5.	80	=	*8000%*	13.	7	=	*7%*
6.	.32	=	*32%*	14.	.0003	=	*.03%*
7.	.005	=	*.5%*	15.	.6	=	*60%*
8.	.0016	=	*.16%*	16.	.025	=	*2.5%*

Change each fraction to a percent:

1.	$\frac{2}{5}$	=	*40%*	9.	$\frac{1}{4}$	=	*25%*
2.	$\frac{6}{25}$	=	*24%*	10.	$\frac{7}{8}$	=	*87.5%*
3.	$\frac{9}{10}$	=	*90%*	11.	$\frac{4}{5}$	=	*80%*
4.	$\frac{1}{10}$	=	*10%*	12.	$\frac{3}{10}$	=	*30%*
5.	$\frac{5}{8}$	=	*62.5%*	13.	$\frac{3}{5}$	=	*60%*
6.	$\frac{4}{25}$	=	*16%*	14.	$\frac{3}{4}$	=	*75%*
7.	$\frac{3}{20}$	=	*15%*	15.	$\frac{20}{50}$	=	*40%*
8.	$\frac{3}{15}$	=	*20%*	16.	$\frac{4}{16}$	=	*25%*

PERCENTS
PRACTICE 2

Change each percent to a decimal:

1. 60% =
2. 8% =
3. 35% =
4. 120% =
5. 95% =
6. 5% =
7. 21.6% =
8. .04% =
9. 37.5% =
10. 100% =
11. 75% =
12. 50% =
13. .5% =
14. 12.5% =
15. .44% =
16. 1% =

Change each percent to a fraction:

1. 6% =
2. 1% =
3. 20% =
4. 99% =
5. 4% =
6. $12\frac{1}{2}\%$ =
7. $37\frac{1}{2}\%$ =
8. $4\frac{1}{2}\%$ =
9. 35% =
10. 90% =
11. 12% =
12. 80% =
13. 59% =
14. $16\frac{2}{3}\%$ =
15. $33\frac{1}{3}\%$ =
16. $5\frac{1}{3}\%$ =

PERCENTS
PRACTICE 2
ANSWER SHEET

Change each percent to a decimal:

1. 60% = .6
2. 8% = .08
3. 35% = .35
4. 120% = 1.2
5. 95% = .95
6. 5% = .05
7. 21.6% = .216
8. .04% = .0004
9. 37.5% = .375
10. 100% = 1
11. 75% = .75
12. 50% = .5
13. .5% = .005
14. 12.5% = .125
15. .44% = .0044
16. 1% = .01

Change each percent to a fraction:

1. 6% = $\frac{3}{50}$
2. 1% = $\frac{1}{100}$
3. 20% = $\frac{1}{5}$
4. 99% = $\frac{99}{100}$
5. 4% = $\frac{1}{25}$
6. $12\frac{1}{2}$% = $\frac{1}{8}$
7. $37\frac{1}{2}$% = $\frac{3}{8}$
8. $4\frac{1}{2}$% = $\frac{9}{200}$
9. 35% = $\frac{7}{20}$
10. 90% = $\frac{9}{10}$
11. 12% = $\frac{3}{25}$
12. 80% = $\frac{4}{5}$
13. 59% = $\frac{59}{100}$
14. $16\frac{2}{3}$% = $\frac{1}{6}$
15. $33\frac{1}{3}$% = $\frac{1}{3}$
16. $5\frac{1}{3}$% = $\frac{4}{75}$

PERCENTS
PRACTICE 3

1. 80% of 65 =
2. 60% of 35 =
3. 125% of 60 =
4. 6.3 % of 300 =
5. 72% of 500 =
6. .4% of 200 =
7. .8% of 56 =
8. 24% of 150 =
9. 5% of 120 =
10. 25% of 36 =
11. 40% of 60 =
12. 35% of 480 =
13. 2.6% of 390 =
14. 7% of 965 =
15. 15% of 50 =
16. 10% of 780 =
17. $33\frac{1}{3}$% of 75 =
18. $6\frac{1}{4}$% of 400 =
19. $66\frac{2}{3}$% of 90 =
20. $1\frac{1}{2}$% of 200 =

PERCENTS
PRACTICE 3
ANSWER SHEET

1. 80% of 65 = *52*

2. 60% of 35 = *21*

3. 125% of 60 = *75*

4. 6.3 % of 300 = *18.9*

5. 72% of 500 = *360*

6. .4% of 200 = *8*

7. .8% of 56 = *4.48*

8. 24% of 150 = *36*

9. 5% of 120 = *6*

10. 25% of 36 = *9*

11. 40% of 60 = *24*

12. 35% of 480 = *168*

13. 2.6% of 390 = *10.14*

14. 7% of 965 = *67.55*

15. 15% of 50 = *7.5*

16. 10% of 780 = *78*

17. $33\frac{1}{3}$% of 75 = *25*

18. $6\frac{1}{4}$% of 400 = *25*

19. $66\frac{2}{3}$% of 90 = *60*

20. $1\frac{1}{2}$% of 200 = *3*

PERCENTS
WORD PROBLEMS

1. There are 24 actors in the community theater. If only 18 of them came one night, what percent of the actors was there?

2. The Walker family makes $360 a week. If they spend $90 each week for food, what percent of their income goes for food?

3. Todd got 36 problems correct out of a total of 40 problems on his test. What percent of the problems did he get correct?

4. Tony weighed 220 pounds. After one month of dieting and exercising, he lost 11 pounds. What percent of his weight did he lose?

5. If the sales tax in Pennsylvania is 6%, how much tax would you pay for a pen that cost $2.50?

6. 460 workers belong to the plumbers' union. If 65% of them went to the last meeting, how many members went to the meeting?

7. Rhonda's night class met every Monday night for 30 weeks. If she was absent from 20% of the classes, how many classes did she miss?

8. Jennifer gets a 15% discount on the price of clothing in the store where she works. How much will she save on a dress that costs $46?

PERCENTS
WORD PROBLEMS
ANSWER SHEET

1. There are 24 actors in the community theater. If only 18 of them came one night, what percent of the actors was there?

   75%

2. The Walker family makes $360 a week. If they spend $90 each week for food, what percent of their income goes for food?

   25%

3. Todd got 36 problems correct out of a total of 40 problems on his test. What percent of the problems did he get correct?

   90%

4. Tony weighed 220 pounds. After one month of dieting and exercising, he lost 11 pounds. What percent of his weight did he lose?

   5%

5. If the sales tax in Pennsylvania is 6%, how much tax would you pay for a pen that cost $2.50?

   $.15

6. 460 workers belong to the plumbers' union. If 65% of them went to the last meeting, how many members went to the meeting?

   299 members

7. Rhonda's night class met every Monday night for 30 weeks. If she was absent from 20% of the classes, how many classes did she miss?

   6 classes

8. Jennifer gets a 15% discount on the price of clothing in the store where she works. How much will she save on a dress that costs $46?

   $6.90

MATH EXTRA

Pre- and Post-tests

(Appendix B)

PRE-TEST

1. Route 83 has 4 lanes. Each lane is 11 feet 9 inches wide. How wide is Route 83?

   A. 14 yards 2 feet
   B. 15 yards 2 feet
   C. 15 yards 2 feet 6 inches
   D. 15 yards
   E. none of these

2. Lois is 67 inches tall. How tall is she in feet and inches?

   A. 6 feet 7 inches
   B. 4 feet 2 inches
   C. 5 feet 7 inches
   D. 5 feet 2 inches
   E. none of these

3. The town of Allensburg went 312 hours without rain. How many days did the town go without rain?

   A. 26 days
   B. 13 days
   C. 18 days
   D. 15 days
   E. none of these

4. Kathy bought 36 yards of material to make tablecloths for the restaurant. If each tablecloth is 4 feet long, how many tablecloths can she make?

   A. 9 tablecloths
   B. 18 tablecloths
   C. 24 tablecloths
   D. 27 tablecloths
   E. none of these

5. Mary has 2 1/2 quarts of Kool Aid in the refrigerator. How many glasses of Kool Aid can she pour if the glasses each hold 1 cup?

   A. 6 glasses
   B. 8 glasses
   C. 10 glasses
   D. 12 glasses
   E. none of these

6. What is the perimeter of a garden that measures 5 yards long and 4.5 yards wide?

A. 22.5 yards
B. 20 yards
C. 19 yards
D. 18.5 yards
E. none of these

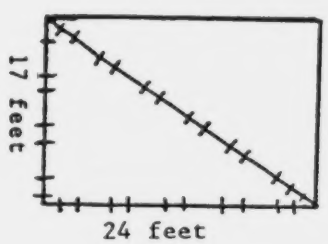
7. How much molding does Greg need to trim a window that measures 29 inches square?

A. 116 inches
B. 841 inches
C. 174 inches
D. 58 inches
E. none of these

8. Patrick wants to carpet a basement play room which measures 19 feet by 27 feet. How many square feet will he need to carpet?

A. 92 square feet
B. 127 square feet
C. 513 square feet
D. 551 square feet
E. none of these

9. Joelle wants to fence the triangular area shown at the right. How much area will the fence enclose?



A. 408 square feet
B. 64 square feet
C. 204 square feet
D. 32 square feet
E. none of these

10. Denise is making a tablecloth with four equal sides. What is the area of the tablecloth if each side measures 4 2/3 feet?

A. 18 2/3 square feet
B. 21 2/3 square feet
C. 21 7/9 square feet
D. 24 4/9 square feet
E. none of these

11. What is the ratio of 9 inches to one yard?

A. $\frac{9}{12}$

B. $\frac{3}{4}$

C. $\frac{1}{4}$

D. $\frac{3}{8}$

E. none of these

12. What is the ratio of 35 minutes to one hour?

A. $\frac{7}{12}$

B. $\frac{35}{5}$

C. $\frac{7}{1}$

D. $\frac{1}{7}$

E. none of these

13. In an accounting class of 21 students, there are 15 women. What is the ratio of men to women?

A. $\frac{2 \text{ men}}{5 \text{ women}}$

B. $\frac{5 \text{ men}}{7 \text{ women}}$

C. $\frac{5 \text{ men}}{2 \text{ women}}$

D. $\frac{7 \text{ men}}{5 \text{ women}}$

E. none of these

14. A recipe for zucchini bread calls for 4 cups of flour for every 2 cups of sugar. How much sugar is needed for 8 cups of flour?

A. 2 cups sugar
B. 4 cups sugar
C. 3 cups sugar
D. 1 cup sugar
E. none of these

15. If 3 pounds of bologna cost $3.45, how much does 1 pound cost?

A. $1.45
B. $1.20
C. $1.15
D. $1.05
E. none of these

16. 12% of the employees at Smith's Department Store work in the shoe department. If the store employs 125 people, how many work in the shoe department?

A. 12 employees
B. 14 employees
C. 15 employees
D. 17 employees
E. none of these

17. If 3 out of 5 students in the class are boys, what percent are boys?

A. 30%
B. 40%
C. 50%
D. 60%
E. none of these

18. Ginger bought a book costing $4.50. If she paid 6% sales tax, what was her total cost?

A. $4.74
B. $4.80
C. $4.84
D. $4.90
E. none of these

19. If you spent $75 out of your $300 paycheck on food, what percent did you spend on food?

A. 15%
B. 20%
C. 25%
D. 30%
E. none of these

20. A chair selling for $210 was marked "20% off." What was the new selling price?

A. $168
B. $190
C. $242
D. $252
E. none of these

BONUS

1. Richard spent 210 minutes on his homework last night. How many hours did he spend studying?

A. 7 hours
B. 4 hours
C. 4 1/2 hours
D. 3 1/2 hours
E. none of these

2. If 1 out of every 5 students drove, how many of 200 students drove to the concert?

A. 40
B. 45
C. 50
D. 55
E. none of these

3. Mary wants to put trim around a triangular-shaped flag. If the flag measures 17 inches by 24 inches by 24 inches, how much trim will she need?

A. 65 inches
B. 82 inches
C. 408 inches
D. 97 inches
E. none of these

NAME_____

DATE _____

PRE-TEST ANSWER SHEET

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

BONUS

1. _____
2. _____
3. _____

NAME_____

DATE _____

PRE-TEST ANSWER SHEET

1. B
2. C
3. B
4. D
5. C
6. C
7. A
8. C
9. C
10. C
11. C
12. A
13. A
14. B
15. C
16. C
17. D
18. E
19. C
20. A

BONUS

1. D
2. A
3. A

POST-TEST

1. Karen is making 6 flags for the summer festival. If she uses 4 feet 5 inches for each flag, how much material will she need?

   A. 8 yards 6 inches
   B. 8 yards 2 feet 6 inches
   C. 10 yards 1 foot 2 inches
   D. 10 yards 2 feet 11 inches
   E. none of these

2. The lamp post is 7 feet 6 inches high. How high is it in inches?

   A. 113 inches
   B. 90 inches
   C. 84 inches
   D. 76 inches
   E. none of these

3. Roy and Heidi won the dance marathon by dancing together for 840 minutes. How many hours did they dance?

   A. 14 hours
   B. 18 hours
   C. 24 hours
   D. 30 hours
   E. none of these

4. John has 12 yards of cord. If he needs to cut it into 9 equal pieces, how long will each piece be?

   A. 2 feet
   B. 3 feet
   C. 4 feet
   D. 5 feet
   E. none of these

5. For the science experiment, each group needs 2 cups of water. If there are 8 groups, how much water is needed?

   A. 4 quarts
   B. 6 quarts
   C. 8 quarts
   D. 10 quarts
   E. none of these

6. What is the perimeter in feet of a shed that is 8 feet long and 6 feet wide?

   A. 28 feet
   B. 38 feet
   C. 48 feet
   D. 58 feet
   E. none of these

7. How many feet of fence is needed to go around a square garden that is 6 feet on each side?

   A. 24 feet
   B. 30 feet
   C. 36 feet
   D. 40 feet
   E. none of these

8. Greg wants to buy a cover for his swimming pool. If the pool measures 25 feet by 15 feet, how many square feet will the cover need to be?

   A. 40 square feet
   B. 80 square feet
   C. 125 square feet
   D. 375 square feet
   E. none of these

9. Mr. Jones needs to tape a triangular-shaped piece of poster board on the wall. If the poster board measures 8 inches by 12 inches by 12 inches, how much tape will he need to go around it?

   A. 32 inches
   B. 30 inches
   C. 28 inches
   D. 22 inches
   E. none of these

10. If a square tarp measures 6 feet on each side, what is the area of the tarp?

   A. 24 square feet
   B. 30 square feet
   C. 34 square feet
   D. 40 square feet
   E. none of these

11. What is the ratio of 8 inches to 1 foot?

A. $\frac{2}{3}$

B. $\frac{3}{2}$

C. $\frac{4}{1}$

D. $\frac{1}{4}$

E. none of these

12. What is the ratio of 18 hours to 1 day?

A. $\frac{4}{3}$

B. $\frac{1}{2}$

C. $\frac{3}{4}$

D. $\frac{2}{1}$

E. none of these

13. In Mrs. Moore's fifth grade class of 25 students, 15 are boys. What is the ratio of boys to girls?

A. $\frac{3 \text{ boys}}{2 \text{ girls}}$

B. $\frac{2 \text{ boys}}{3 \text{ girls}}$

C. $\frac{3 \text{ boys}}{5 \text{ girls}}$

D. $\frac{5 \text{ boys}}{3 \text{ girls}}$

E. none of these

14. The directions on the drink concentrate say to mix 1/2 cup of concentrate with 4 cups of water. How much water is needed if 1 1/2 cups of concentrate are used?

A. 6 cups of water
B. 8 cups of water
C. 10 cups of water
D. 12 cups of water
E. none of these

15. If 6 pens cost $1.50, how much does 1 pen cost?

A. $.23
B. $.25
C. $.27
D. $.29
E. none of these

16. 40% of the books in the store are nonfiction. If there are 1,345 books in the store, how many books are nonfiction?

A. 494 books
B. 504 books
C. 514 books
D. 524 books
E. none of these

17. The coats on the rack were on sale for 30% off the regular price. What would the sale price be for a $200 coat?

A. $120
B. $135
C. $150
D. $170
E. none of these

18. Bill bought a blanket costing $18.40. If he was charged 5% sales tax, what was his total cost?

A. $18.92
B. $19.32
C. $19.52
D. $19.72
E. none of these

19. If 6 out of 24 students have blue eyes, what percent of students have blue eyes?

A. 20%
B. 25%
C. 30%
D. 35%
E. none of these

20. Sharon's grocery store bill was $50. If she spent $10 on meat, what percent of her bill was for meat?

A. 17%
B. 20%
C. 25%
D. 28%
E. none of these

BONUS

1. If 2 out of every 3 dogs at the pound are wearing collars, how many of the 18 dogs are wearing collars?

A. 10 dogs
B. 11 dogs
C. 12 dogs
D. 13 dogs
E. none of these

2. The bicycle factory went 112 days without an accident. How many weeks would this be?

A. 16 weeks
B. 17 weeks
C. 18 weeks
D. 19 weeks
E. none of these

3. Jim cut a piece of plywood into the shape of a triangle. Find the area of the triangle if the base measures 8 feet and the height measures 6 feet.

A. 14 square feet
B. 24 square feet
C. 36 square feet
D. 48 square feet
E. none of these

NAME_____

DATE _____

POST-TEST ANSWER SHEET

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

BONUS

1. _____
2. _____
3. _____

NAME_____

DATE _____

POST-TEST ANSWER SHEET

1. B
2. B
3. A
4. C
5. A
6. A
7. A
8. D
9. A
10. E
11. A
12. C
13. A
14. D
15. B
16. E
17. E
18. B
19. B
20. B

BONUS

1. C
2. A
3. B

MATH EXTRA

Participant Survey Form

(Appendix C)

MATH EXTRA SURVEY

1. How would you rate the math curriculum?

   _____ excellent

   _____ good

   _____ fair

   _____ poor

2. Do you feel the word-problem solving has helped you to regain any basic math skills?

   _____ yes

   _____ no

3. Do you feel it will help you more easily pass entrance tests for job training or continuing education?

   _____ yes

   _____ no

4. Do you feel that the curriculum helped you to enhance your job skills for employment?

   _____ yes

   _____ no

5. Which areas or concepts in the math curriculum do you feel are the most beneficial? (Check as many as might apply to you.)

   _____ measurement

   _____ perimeter and area

   _____ ratio and proportion

   _____ percents

   other_____
   (please list specific area)

6. After completing the math curriculum, will you be considering:

   _____ continued education

   _____ job searching

   _____ still undecided

7. On the reverse side list any recommendations you could offer to improve the math curriculum.

MATH EXTRA

Bibliography

(Appendix D)

BIBLIOGRAPHY

Gafney, Leo and Beers, John C. Essential Math Skills: A Mathematics Competency Workbook. New York: Phoenix Learning Resources, 1990.

Howett, Jerry. GED Mathematics. Chicago: Contemporary Books, Inc., 1989.

Howett, Jerry. Number Power 2: Fractions, Decimals and Percents. Chicago: Contemporary Books, Inc., 1988.

Mitchell, Robert. Number Power 3: Algebra. Chicago: Contemporary Books, Inc., 1983.

Mitchell, Robert and Prickel, Donald. Number Power 4: Geometry. Chicago: Contemporary Books, Inc., 1984.

Tamarkin, Kenneth. Number Power 6: Word Problems. Chicago: Contemporary Books, Inc., 1983.

MATH EXTRA

by Suzanne Webster
Project Facilitator
CIU 10 Development Center for Adults
410 Shaw Street
Clearfield, PA 16830

Central Intermediate Unit 10
R. R. 1, Box 374
West Decatur, PA 16878

June 30, 1995
PDE Project 98-5018 $4993

PA Department of Education
333 Market Street
Harrisburg, PA 17126-0333

MATH EXTRA

TABLE OF CONTENTS

1. Pre-testing: Optional Pre-test . . . . . .Page 1
2. Introduction to Word Problems . . . . . .Page 10
3. English or Standard U.S. Measurement. . . . . .Page 24
4. Perimeter and Area. . . . . .Page 34
5. Ratio and Proportion . . . . . .Page 47
6. Percents . . . . . .Page 54
7. Post-testing: Optional Post-test . . . . . .Page 67
8. Appendix
   - A. Credits . . . . . .Page 74
   - B. Bibliography. . . . . .Page 75

PRE-TESTING

PRE-TESTING

OBJECTIVE:

To determine the strengths and weaknesses of the adult learner; to have a means for dividing students into levels for group work; to allow adult learners to experience a nonthreatening learning environment; to offer remediation

RATIONALE:

Adult learners often possess math skills and information of which they are unaware. Sometimes these skills are merely forgotten without reinforced daily use. Ideally, we want to believe that everyone has had prior exposure to all mathematical procedures and can add, subtract, multiply and divide whole numbers, fractions, and decimals. Realistically, we must recognize that a deficiency may exist in basic mathematical computation. Since it is important to know basic computation to approach word problem solving, a pre-testing is necessary to determine every participant's strengths and weaknesses and to offer remediation. Also, pre-testing aids the instructor in grouping individuals in nonthreatening, noncompetitive groups where they are immediately made to feel comfortable and welcome.

The arithmetic portion of the Tests of Adult Basic Education (TABE), Level D, specifically, problems 56 to 135 -- or any other similar test, is appropriate. Also, if a reading problem is suspected, proper testing to ascertain the reading weakness is necessary.

TESTING METHODOLOGY:

Assure participants that the pre-test to be administered is not an indication of mathematical intelligence or learning ability. The test is NOT to be used as a means of self-measurement or as a comparison with other class participants.

Explain that the test will be used only to determine each student's mathematical strengths and weaknesses for working with word problem solving, for dividing participants into similar groups for in-class work, and for offering remediation in weak areas.

Stress that basic math computation--addition, subtraction, multiplication and division of whole numbers, fractions and decimals--is essential to word problem solving.

Administer the test as per the instuctions in the teacher's testing manual.

OPTIONAL PRE-TEST

Many students show a desire to measure their mathematical progress in a pre- and post-testing situtation.

This pre-test is designed to give participants initial exposure to word problem solving while allowing them to discover their strengths and weaknesses before curriculum introduction.

Although the test has 23 problems, it should be graded as a 20-problem test with three bonus problems supplementing the final score. The bonus questions are included to give participants the opportunity to maintain their self-confidence by having a "second chance" at word problem solving. Again, it is the strategies and mathematical procedures that are important, rather than the score.

At the end of the curriculum is an optional post-test which students can use to test their "learned" skills.

PRE-TEST

1. Route 83 has 4 lanes. Each lane is 11 feet 9 inches wide. How wide is Route 83?

   A. 14 yards 2 feet
   B. 15 yards 2 feet
   C. 15 yards 2 feet 6 inches
   D. 15 yards
   E. none of these

2. Lois is 67 inches tall. How tall is she in feet and inches?

   A. 6 feet 7 inches
   B. 4 feet 2 inches
   C. 5 feet 7 inches
   D. 5 feet 2 inches
   E. none of these

3. The town of Allensburg went 312 hours without rain. How many days did the town go without rain?

   A. 26 days
   B. 13 days
   C. 18 days
   D. 15 days
   E. none of these

4. Kathy bought 36 yards of material to make tablecloths for the restaurant. If each tablecloth is 4 feet long, how many tablecloths can she make?

   A. 9 tablecloths
   B. 18 tablecloths
   C. 24 tablecloths
   D. 27 tablecloths
   E. none of these

5. Mary has 2 1/2 quarts of Kool Aid in the refrigerator. How many glasses of Kool Aid can she pour if the glasses each hold 1 cup?

   A. 6 glasses
   B. 8 glasses
   C. 10 glasses
   D. 12 glasses
   E. none of these

6. What is the perimeter of a garden that measures 5 yards long and 4.5 yards wide?

A. 22.5 yards
B. 20 yards
C. 19 yards
D. 18.5 yards
E. none of these

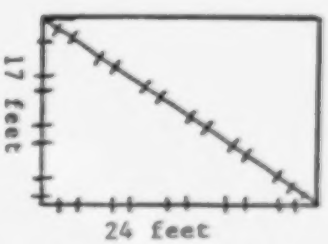
7. How much molding does Greg need to trim a window that measures 29 inches square?

A. 116 inches
B. 841 inches
C. 174 inches
D. 58 inches
E. none of these

8. Patrick wants to carpet a basement play room which measures 19 feet by 27 feet. How many square feet will he need to carpet?

A. 92 square feet
B. 127 square feet
C. 513 square feet
D. 551 square feet
E. none of these

9. Joelle wants to fence the triangular area shown at the right. How much area will the fence enclose?



A. 408 square feet
B. 64 square feet
C. 204 square feet
D. 32 square feet
E. none of these

10. Denise is making a tablecloth with four equal sides. What is the area of the tablecloth if each side measures 4 2/3 feet?

A. 18 2/3 square feet
B. 21 2/3 square feet
C. 21 7/9 square feet
D. 24 4/9 square feet
E. none of these

11. What is the ratio of 9 inches to one yard?

A. $\frac{9}{12}$

B. $\frac{3}{4}$

C. $\frac{1}{4}$

D. $\frac{3}{8}$

E. none of these

12. What is the ratio of 35 minutes to one hour?

A. $\frac{7}{12}$

B. $\frac{35}{5}$

C. $\frac{7}{1}$

D. $\frac{1}{7}$

E. none of these

13. In an accounting class of 21 students, there are 15 women. What is the ratio of men to women?

A. $\frac{2 \text{ men}}{5 \text{ women}}$

B. $\frac{5 \text{ men}}{7 \text{ women}}$

C. $\frac{5 \text{ men}}{2 \text{ women}}$

D. $\frac{7 \text{ men}}{5 \text{ women}}$

E. none of these

14. A recipe for zucchini bread calls for 4 cups of flour for every 2 cups of sugar. How much sugar is needed for 8 cups of flour?

A. 2 cups sugar
B. 4 cups sugar
C. 3 cups sugar
D. 1 cup sugar
E. none of these

15. If 3 pounds of bologna cost $3.45, how much does 1 pound cost?

A. $1.45
B. $1.20
C. $1.15
D. $1.05
E. none of these

16. 12% of the employees at Smith's Department Store work in the shoe department. If the store employs 125 people, how many work in the shoe department?

A. 12 employees
B. 14 employees
C. 15 employees
D. 17 employees
E. none of these

17. If 3 out of 5 students in the class are boys, what percent are boys?

A. 30%
B. 40%
C. 50%
D. 60%
E. none of these

18. Ginger bought a book costing $4.50. If she paid 6% sales tax, what was her total cost?

A. $4.74
B. $4.80
C. $4.84
D. $4.90
E. none of these

19. If you spent $75 out of your $300 paycheck on food, what percent did you spend on food?

A. 15%
B. 20%
C. 25%
D. 30%
E. none of these

20. A chair selling for $210 was marked "20% off." What was the new selling price?

A. $168
B. $190
C. $242
D. $252
E. none of these

BONUS

1. Richard spent 210 minutes on his homework last night. How many hours did he spend studying?

A. 7 hours
B. 4 hours
C. 4 1/2 hours
D. 3 1/2 hours
E. none of these

2. If 1 out of every 5 students drove, how many of 200 students drove to the concert?

A. 40
B. 45
C. 50
D. 55
E. none of these

3. Mary wants to put trim around a triangular-shaped flag. If the flag measures 17 inches by 24 inches by 24 inches, how much trim will she need?

A. 65 inches
B. 82 inches
C. 408 inches
D. 97 inches
E. none of these

NAME_____

DATE _____

PRE-TEST ANSWER SHEET

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

BONUS

1. _____
2. _____
3. _____

NAME_____

DATE _____

PRE-TEST ANSWER SHEET

1. B
2. C
3. B
4. D
5. C
6. C
7. A
8. C
9. C
10. C
11. C
12. A
13. A
14. B
15. C
16. C
17. D
18. E
19. C
20. A

BONUS

1. D
2. A
3. A

INTRODUCTION TO WORD PROBLEMS

INTRODUCTION TO WORD PROBLEMS

OBJECTIVE:

To develop strategies for solving word problems

RATIONALE:

Word problems are a part of real life. They occur daily at work, in job placement, and in job training tests. Adult learners need guides to visualization and a set approach for attacking word problem solving.

VOCABULARY:

unnecessary information - information that will not help to solve a problem

number operations - the process of using one of four math procedures: addition, subtraction, multiplication and division

question words - key words that indicate that a question will be asked: who, what, when, where, why, which, how

LESSON METHODOLOGY:

Explain that there is a procedure that is often effective in determining how to solve word problems:

*Use Hand-out: "Introduction to Word Problems - Steps for Solving Word Problems"

Carefully read over the six steps.

Place the following word problem on the board:

Mrs. Smith is having a birthday party for her husband who will be 40 years old. Mrs. Smith is 38 years old. She plans to have a combined barbecue and birthday party at her home. To date, she has invited 12 couples. How many hot dogs should Mrs. Smith purchase?

Ask the students to solve the problem. They may be tempted to say 24 or 26 hot dogs. This problem cannot be solved since we do not know how many hot dogs each person will eat, if Mr. and Mrs. Smith are eating hot dogs, or if Mrs. Smith plans to invite more couples.

Only by adding the following phrase to the last sentence would the problem be solved:

...if each person eats only one hot dog and only 12 couples, including the Smiths, plan to attend.

Ask the students to look at the problem again and find information that does not help them solve the problem.

Ask these questions to your class:

1. Would it make a difference if Mr. Smith was going to be 45 years old, instead of 40?

2. Would it make a difference in the quantity of hot dogs if Mrs. Smith was called Mrs. White?

3. Does the location of the party or Mrs. Smith's age have any effect on the solution of the problem?

Tell the students that this is unnecessary information--information which is not needed to find the solution to the problem.

Once we have determined that we have only necessary information, we must determine what the question is asking for. Then, we need to determine the mathematical operation we will need to use.

There are several key words which are frequently found in word problems which may help us decide what mathematical operation to use.

*Use Hand-out: "Introduction to Word Problems - Clue Words in Mathematical Operations"

Carefully read over the clue words under each operation. Explain that key words can be deceiving.

FOR EXAMPLE:

On Saturday, John left four shirts at the cleaners to be picked up on Tuesday. He had two more at home which also needed to be cleaned. Altogether he has a wardrobe of ten shirts for work. What is the total number of clean shirts John has to select from for work on Monday?

Explain to the students that key words can be misleading. To find the total number of clean shirts you must subtract the total number of dirty shirts from the total number of all shirts. All words should be carefully considered in a word problem to obtain the correct answer.

*Use Hand-out: "Introduction to Word Problems - Using Correct Operations"

Using hand-out, give students 10-15 minutes to underline the necessary information needed to solve the problem and to determine what operation is needed to solve the problem. Together, discuss the problems and name the correct operations. Then, using the correct operation, have students work together to solve the problems.

*Use Hand-out: "Introduction to Word Problems - Practice"

Using hand-out, have students divide into pairs or groups of no more than three to set up and solve the word problems.

INTRODUCTION TO WORD PROBLEMS
STEPS FOR SOLVING WORD PROBLEMS

1. Read the problem slowly and carefully. Try to restate the problem in your own words. Try to visualize the problem. Use drawings and sketches.

2. Sort out the information. Ask yourself:

   a. What is necessary to the solution of the problem?

   b. Is there additional information which is not needed for its solution?

   c. Which numbers in the problem should I use to solve it?

3. Identify clue words which may tell you what to do. Be sure you are not misled.

4. Read the problem again. Then ask yourself:

   a. What is the question asking for?

   b. What does the problem want me to find?

   c. What mathematical operation will I need to use?

** d. Will I need more than one operation?

5. Do the math. Find the solution or answer.

6. Check your arithmetic and computations.
   Check your answer to make sure it is logical.

** If more than one operation is needed, this indicates a multi-step problem. You can solve a multi-step problem by breaking it into two or more one-step problems, using the same basic steps as above.

INTRODUCTION TO WORD PROBLEMS

CLUE WORDS IN MATHEMATICAL OPERATIONS - Page 1

ADDITION:

add	both	increase	raise
additional	combined	more	sum
altogether	in all	plus	total
and			

SUBTRACTION:

balance	dropped	grow	more than
change	fell	left	reduce
decrease	fewer	less than	remain
difference	go up	lost	

Nearer, farther, and other "-er" comparison words

MULTIPLICATION:

at	by	per	twice
area	multiplied	times	volume
as much	of	total	

DIVISION:

average	each	out of	shared
cut	equal pieces	per	split
divided evenly	every	ratio	

INTRODUCTION TO WORD PROBLEMS
CLUE WORDS IN MATHEMATICAL OPERATIONS - Page 2

Addition:

How much money was spent?
What is the total amount of money spent?
He has $5 more this week.
$10 was added to the amount he had.
The bus fare was increased by 15 cents.
What is the sum of the digits?
What is their combined scores?

Subtraction:

How much less was spent?
How many fewer students went to the zoo this year?
What is the difference in the amount spent?
How much remains?
By how much has the total decreased?
What is the balance in the account?
How many more went today?
How many seats are left?

Multiplication:

What was the total amount spent?
Five times as many people work in the factory.
What is the cost of three dozen at 69 cents a dozen?
How many miles at 50 miles per hour?

Division:

The money was divided equally.
How much does each one cost?
1,344 yards were gained on 56 passes. How many yards per pass?

INTRODUCTION TO WORD PROBLEMS

USING CORRECT OPERATIONS - Page 1

In each of the following problems, list the operation (addition, subtraction, multiplication, or division), necessary to find the solution. First, decide what information is not needed, and which information is needed. Underline the important information, then list the proper operation. Do NOT solve the problem.

1. Maria has collected 418 stamps. Her friend, Sally, has collected 352 stamps. If Maria's stamp album holds 500 stamps, how many more stamps must she collect to complete her album?

   Operation Needed_____

2. Mr. White makes $260 a week. Mr. Johnson, their neighbor, makes $301 a week. Mrs. White makes $210 a week. What is the combined weekly income of the White family?

   Operation Needed_____

3. There are three feet in a yard and 5280 feet in a mile. How many feet are there in 30 yards?

   Operation Needed_____

4. Last year, Bob and Jane paid $1,716 for car payments and $3,720 in yearly rent. How much did they pay on a monthly basis for their car?

   Operation Needed_____

5. Rita and her three friends went together to buy a lottery ticket. Their ticket won $600. How much money did each person win?

   Operation Needed_____

INTRODUCTION TO WORD PROBLEMS
USING CORRECT OPERATIONS - Page 2

6. James makes $1200 a month. He pays $265 a month for rent, $400 a month for food, and $135 a month for car payments. How much more does James pay for food than for rent in a month?

Operation Needed_____

7. A child's ticket to the museum cost $4.50. An adult's ticket cost $8.00. If 26 children attend the museum, how much money is collected for the children's tickets?

Operation Needed_____

8. Ellen works for a law firm. Each day, she drives eight miles to work. As a legal secretary, she can type 80 words a minute. How long will it take her to type a letter that contains 1680 words?

Operation Needed_____

9. For November, the Burton's utility bills were $50 for electricity, $43 for telephone, and $79 for heat. What is the total cost of their November utilities?

Operation Needed_____

10. Pete's grandmother gave him $80 for his birthday. He put one-half of it in the bank. The remainder he divided evenly and spend it on clothes, gas, food, and books. How many books at $5 a piece, did Pete purchase with the money?

Operation Needed_____

INTRODUCTION TO WORD PROBLEMS

USING CORRECT OPERATIONS - Page 1

ANSWER SHEET

In each of the following problems, list the operation (addition, subtraction, multiplication, or division), necessary to find the solution. First, decide what information is not needed, and which information is needed. Underline the important information, then list the proper operation. Do NOT solve the problem.

1. Maria has collected 418 stamps. Her friend, Sally, has collected 352 stamps. If Maria's stamp album holds 500 stamps, how many more stamps must she collect to complete her album?

   Operation Needed *subtraction* *(82 stamps)*

2. Mr. White makes $260 a week. Mr. Johnson, their neighbor, makes $301 a week. Mrs. White makes $210 a week. What is the combined weekly income of the White family?

   Operation Needed *addition* *($470)*

3. There are three feet in a yard and 5280 feet in a mile. How many feet are there in 30 yards?

   Operation Needed *multiplication* *(90 feet)*

4. Last year, Bob and Jane paid $1,716 for car payments and $3,720 in yearly rent. How much did they pay on a monthly basis for their car?

   Operation Needed *division* *($143)*

5. Rita and her three friends went together to buy a lottery ticket. Their ticket won $600. How much money did each person win?

   Operation Needed *division* *($150)*

INTRODUCTION TO WORD PROBLEMS
USING CORRECT OPERATIONS - Page 2
ANSWER SHEET

6. James makes $1200 a month. He pays $265 a month for rent, $400 a month for food, and $135 a month for car payments. How much more does James pay for food than for rent in a month?

Operation Needed *subtraction* *($135)*

7. A child's ticket to the museum cost $4.50. An adult's ticket cost $8.00. If 26 children attend the museum, how much money is collected for the children's tickets?

Operation Needed *multiplication* *($117)*

8. Ellen works for a law firm. Each day, she drives eight miles to work. As a legal secretary, she can type 80 words a minute. How long will it take her to type a letter that contains 1680 words?

Operation Needed *division* *(21 minutes)*

9. For November, the Burton's utility bills were $50 for electricity, $43 for telephone, and $79 for heat. What is the total cost of their November utilities?

Operation Needed *addition* *($172)*

10. Pete's grandmother gave him $80 for his birthday. He put one-half of it in the bank. The remainder he divided evenly and spend it on clothes, gas, food, and books. How many books at $5 a piece, did Pete purchase with the money?

Operation Needed *division* *(2 books)*

INTRODUCTION TO WORD PROBLEMS

PRACTICE - Page 1

1. Jane worked 30 hours the first week of July, 23 hours the second, 15 hours the third week, and 28 hours the fourth. How many hours did Jane work during the month of July?

2. The automobile odometer of Bill's car reads 8,756 miles. He plans to take a 560 mile drive to Chicago on Monday and a 210 mile drive to Pittsburgh on Tuesday. What will be the reading of his odometer when he reaches Chicago?

3. Raymond earned a gross salary of $17,800 last year. The company deducted $4,700 from his salary for taxes and health benefits. What was Raymond's net income after deductions last year?

4. The first year an electronics factory was in business it employed 65 people. By the end of the second year, it had grown to 201 employees. How many employees did the factory add the second year?

5. How many nine-inch pieces can be cut from a board that measures 108 inches in length?

INTRODUCTION TO WORD PROBLEMS
PRACTICE - Page 2

6. Margie and her two sisters agreed to split the cost of lunch. If the bill for sandwiches and drinks amounted to $15.48, how much did Margie pay?

7. If a gallon of unleaded gas costs $1.24 per gallon and a gallon of diesel fuel cost $1.05, how much would 17.5 gallons of unleaded gas cost?

8. Sally earns $1,206 each month and pays $215 in rent each month. How much does Sally pay for rent in one year?

9. Following a recipe, Mike added 2 1/3 cups milk, 2/3 cup water and 2 1/2 cups sugar in a bowl that holds 8 cups. How much liquid did he put in the bowl?

10. Aunt Mabel gave Gloria a jar of pennies to divide evenly among Gloria's three children. The pennies amounted to $103.32. How much did each child get?

INTRODUCTION TO WORD PROBLEMS

PRACTICE - Page 1

ANSWER SHEET

1. Jane worked 30 hours the first week of July, 23 hours the second, 15 hours the third week, and 28 hours the fourth. How many hours did Jane work during the month of July?

96 hours

2. The automobile odometer of Bill's car reads 8,756 miles. He plans to take a 560 mile drive to Chicago on Monday and a 210 mile drive to Pittsburgh on Tuesday. What will be the reading of his odometer when he reaches Chicago?

9,316 miles

3. Raymond earned a gross salary of $17,800 last year. The company deducted $4,700 from his salary for taxes and health benefits. What was Raymond's net income after deductions last year?

$13,100

4. The first year an electronics factory was in business it employed 65 people. By the end of the second year, it had grown to 201 employees. How many employees did the factory add the second year?

136 employees

5. How many nine-inch pieces can be cut from a board that measures 108 inches in length?

12 pieces

INTRODUCTION TO WORD PROBLEMS

PRACTICE - Page 2

ANSWER SHEET

6. Margie and her two sisters agreed to split the cost of lunch. If the bill for sandwiches and drinks amounted to $15.48, how much did Margie pay?

$5.16

7. If a gallon of unleaded gas costs $1.24 per gallon and a gallon of diesel fuel cost $1.05, how much would 17.5 gallons of unleaded gas cost?

$21.70

8. Sally earns $1,206 each month and pays $215 in rent each month. How much does Sally pay for rent in one year?

$2,580

9. Following a recipe, Mike added 2 1/3 cups milk, 2/3 cup water and 2 1/2 cups sugar in a bowl that holds 8 cups. How much liquid did he put in the bowl?

3 cups

10. Aunt Mabel gave Gloria a jar of pennies to divide evenly among Gloria's three children. The pennies amounted to $103.32. How much did each child get?

$34.44

ENGLISH

OR

STANDARD

U.S.

MEASUREMENT

ENGLISH OR STANDARD U.S. MEASUREMENT

OBJECTIVE:

To solve problems requiring English (or Standard U.S.) measures and weights.

RATIONALE:

This lesson provides practice in the use of non-metric measurements which adult learners encounter in daily life. Unlike metric, which uses the base 10, English measurement has various number bases. Conversion of smaller units to larger and larger units to smaller requires memorization of the measurement chart. Many word problems deal with measurements of time, weight, length and capacity.

VOCABULARY:

unit - a measure
convert - to exchange for a specified equivalent

LESSON METHODOLOGY:

Ask students to think of various entities or commodities that need to be measured. Then ask them what unit of measurement is appropriate to use. The following are examples:

time	minutes, hours, days, weeks, months, years
eggs	dozens
cloth	inches, yards
carpeting	yards
flour	teaspoons, tablespoons, cups
coal	pounds, tons
milk	cups, pints, quarts, gallons
distance	inches, feet, yards, miles

Explain that when we work with weights and measures, we need to know the base of the unit we are using.

* Use Hand-out: "English or Standard U.S. Measurement - Equivalences and Abbreviations"

Using the hand-out chart, tell participants that to convert inches to feet, our base is 12 inches in a foot. When converting inches to yards, our base is 36 because there are 36 inches in a yard. When moving between feet and yards, the base changes to 3 because there are three feet in one yard.

Review the chart carefully. Put examples on the board which require both multiplication and division for converting units. Give participants the following rules for converting: When changing to a smaller unit, multiply; when changing to a larger unit, divide.

Examples: 18 ft = _____yd
18 ÷ 3 = 6

Answer: 18 ft = **6** yd

8 hr = _____min
8 x 60 = 480

Answer: 8 hr = **480** min

22 oz = _____ lb _____oz
22 ÷ 16 = 1 with a remainder of 6 = 1 lb 6 oz

Answer: 22 oz = **1** lb **6** oz

* Use Hand-out: "English or Standard U.S. Measurement - Practice 1"

Divide students into groups of no more than three students. Use hand-outs and have students work together to solve the conversions. Review the correct answers.

Using examples, show how measurement is added, subtracted, multiplied, and divided.

Examples:
2 ft 5 in
+ 2 ft 6 in
4 ft 11 in = 1 yd 1 ft 11 in

Answer: **1 yd 1 ft 11 in**

$$\begin{array}{rl} 4 \text{ min } 48 \text{ sec} & = 3 \text{ min } 108 \text{ sec} \\ \underline{- 1 \text{ min } 49 \text{ sec}} & = \underline{- 1 \text{ min } 49 \text{ sec}} \\ & 2 \text{ min } 59 \text{ sec} \end{array}$$

Answer: **2 min 59 sec**

$$\begin{array}{r} 4 \text{ gal } 3 \text{ qt} \\ \underline{\times \quad 5} \\ 20 \text{ gal } 15 \text{ qt} \end{array} = 23 \text{ gal } 3 \text{ qt}$$

Answer: **23 gal 3 qt**

$$\begin{array}{r} \quad 3 \text{ wk} \quad 2 \text{ da} \\ \hline 4 \,/\, 13 \text{ wk} \quad 1 \text{ da} \\ \underline{-12} \\ 1 \text{ wk} = \underline{+7 \text{ da}} \\ 8 \text{ da} \\ \underline{8 \text{ da}} \end{array}$$

Answer: **3 wk 2 da**

* Use Hand-out: "English or Standard U.S. Measurement - Practice 2"

Once students have a workable knowledge of conversion, proceed with practice sheet, allowing students to work in groups.

* Use Hand-out: "English or Standard U.S. Measurement - Word Problems"

Using hand-out, have students work in groups to set up and solve word problems involving measurement.

ENGLISH OR STANDARD U.S. MEASUREMENT
EQUIVALENCES AND ABBREVIATIONS

English measurement is the standard unit of measurement for length, time, liquid measure and weight commonly used in the United States.

Take time to review the chart below and commit to memory those units and equivalences that you may have forgotten.

MEASURES OF LENGTH

1 inch (in. or ")		
1 foot (ft or ')	=	12 inches
1 yard (yd)	=	36 inches or 3 feet
1 mile (mi)	=	5280 feet or 1760 yards

MEASURES OF TIME

1 second (sec)		
1 minute (min)	=	60 seconds
1 hour (hr)	=	60 minutes
1 day (da)	=	24 hours
1 week (wk)	=	7 days
1 year (yr)	=	365 days or 12 months or 52 weeks
1 leap year	=	366 days
1 decade	=	10 years
1 century	=	100 years

LIQUID MEASURE

1 ounce (oz)		
1 cup (C)	=	8 ounces
1 pint (pt)	=	16 ounces
1 pint	=	2 cups
1 quart (qt)	=	2 pints or 4 cups
1 gallon (gal)	=	4 quarts

MEASURE OF WEIGHT

1 ounce (oz)		
1 pound (lb)	=	16 ounces
1 ton (T)	=	2000 pounds

OTHER

3 teaspoons (t or tsp)	=	1 tablespoon (T or Tbsp)
16 tablespoons	=	1 cup
8 tablespoons	=	1/2 cup
4 tablespoons	=	1/4 cup
12 items	=	1 dozen

ENGLISH OR STANDARD U.S. MEASUREMENT
PRACTICE 1

REMEMBER: When changing to a smaller unit, multiply.
When changing to a larger unit, divide.

Convert:

1. 21 ft = _____yd
2. 5 yd = _____ft
3. 6 ft = _____in
4. 96 in = _____ft
5. 9 mi = _____ft
6. 10,560 ft = _____mi
7. 300 min = _____hr
8. 3 da = _____hr
9. 480 sec = _____min
10. 128 oz = _____lb
11. 3 lb = _____oz
12. 8 cup = _____qt

Simplify:

13. 1 ft 21 in = _____ft _____in
14. 2 yd 13 ft = _____yd _____ft
15. 27 da = _____wk _____da
16. 68 ft = _____yd _____ft
17. 21 min 70 sec = _____min _____sec
18. 7 pt = _____qt _____pt
19. 20 oz = _____lb _____oz
20. 88 min = _____hr _____min

ENGLISH OR STANDARD U.S. MEASUREMENT

PRACTICE 1

ANSWER SHEET

REMEMBER: When changing to a smaller unit, multiply.
When changing to a larger unit, divide.

Convert:

1. 21 ft = *7* yd
2. 5 yd = *15* ft
3. 6 ft = *72* in
4. 96 in = *8* ft
5. 9 mi = *47,520* ft
6. 10,560 ft = *2* mi
7. 300 min = *5* hr
8. 3 da = *72* hr
9. 480 sec = *8* min
10. 128 oz = *8* lb
11. 3 lb = *48* oz
12. 8 cup = *2* qt

Simplify:

13. 1 ft 21 in = *2* ft *7* in
14. 2 yd 13 ft = *6* yd *1* ft
15. 27 da = *3* wk *6* da
16. 68 ft = *22* yd *2* ft
17. 21 min 70 sec = *22* min *10* sec
18. 7 pt = *3* qt *1* pt
19. 20 oz = *1* lb *4* oz
20. 88 min = *1* hr *28* min

ENGLISH OR STANDARD U.S. MEASUREMENT
PRACTICE 2

Add:

1. 5 yd 2 ft
   + 6 yd 3 ft

2. 18 min 25 sec
   + 2 min 45 sec

3. 6 qt 6 pt
   + 5 qt 3 pt

Subtract:

4. 8 cups 1 oz
   - 2 cups 7 oz

5. 10 wk 3 da
   - 1 wk 5 da

6. 46 lb 10 oz
   - 3 lb 12 oz

Multiply:

7. 2 ft 9 in
   X 7

8. 13 gal 3 qt
   X 10

9. 1 pt 3 cups
   X 3

Divide:

10. 3 / 5 ft 3 in

11. 2 / 7 yd 1 ft

12. 2 / 5 lb 4 oz

ENGLISH OR STANDARD U.S. MEASUREMENT

PRACTICE 2

ANSWER SHEET

Add:

1. 5 yd 2 ft + 6 yd 3 ft = *12 yd 2 ft*

2. 18 min 25 sec + 2 min 45 sec = *21 min 10 sec*

3. 6 qt 6 pt + 5 qt 3 pt = *3 gal 3 qt 1 pt*

Subtract:

4. 8 cups 1 oz - 2 cups 7 oz = *5 cups 2 oz*

5. 10 wk 3 da - 1 wk 5 da = *8 wk 5 da*

6. 46 lb 10 oz - 3 lb 12 oz = *42 lb 14 oz*

Multiply:

7. 2 ft 9 in X 7 = *6 yd 1 ft 3 in*

8. 13 gal 3 qt X 10 = *137 gal 2 qt*

9. 1 pt 3 cups X 3 = *3 qt 1 pt 1 cup*

Divide:

10. 3 / 5 ft 3 in = *1 ft 9 in*

11. 2 / 7 yd 1 ft = *3 yd 2 ft*

12. 2 / 5 lb 4 oz = *2 lb 10 oz*

ENGLISH OR STANDARD U.S. MEASUREMENT
WORD PROBLEMS

1. Gloria's daughter is 30 months old. How many years old is she?

2. 200 gallons of ketchup were bottled in quart containers. How many quart containers were needed?

3. Caren has a 204-inch roll of ribbon. How many feet of ribbon does she have?

4. If Judy is to work an 8 hour shift and has already worked 6 hours and 39 minutes, how much longer does she have to work?

5. Greg's father can hit a golf ball 250 yards. How many feet is this?

6. Mr. Jones has a pine tree that is 7 feet 8 inches tall. If it grows 5 inches during the next year, how tall will it be?

7. Patrick will study each of his five subjects for 1 hour and 20 minutes. What is the total time Patrick will study?

8. Last winter it snowed 4 inches in December, 9 inches in January, and 10 inches in February. What was the total amount of snowfall in feet and inches?

PERIMETER

AND

AREA

ENGLISH OR STANDARD U.S. MEASUREMENT
WORD PROBLEMS

1. Gloria's daughter is 30 months old. How many years old is she?

   2 years and 6 months or

   $2\frac{1}{2}$ years

2. 200 gallons of ketchup were bottled in quart containers. How many quart containers were needed?

   800 quart bottles

3. Caren has a 204-inch roll of ribbon. How many feet of ribbon does she have?

   17 feet of molding

4. If Judy is to work an 8 hour shift, and has already worked 6 hours and 39 minutes, how much longer does she have to work?

   1 hour and 21 minutes

5. Greg's father can hit a golf ball 250 yards. How many feet is this?

   750 feet

6. Mr. Jones has a pine tree that is 7 feet 8 inches tall. If it grows 5 inches during the next year, how tall will it be?

   8 feet 1 inch

7. Patrick will study each of his five subjects for 1 hour and 20 minutes. What is the total time Patrick will study?

   6 hours and 40 minutes

8. Last winter it snowed 4 inches in December, 9 inches in January, and 10 inches in February. What was the total amount of snowfall in feet and inches?

   1 foot 11 inches

PERIMETER AND AREA

OBJECTIVE:

To learn how to compute the perimeter and area of simple figures.

RATIONALE:

The computation of perimeter and area occur in real life situations. Students need to solve simple measurement problems.

VOCABULARY:

figure	-	a shape which can be in open or closed form
closed	-	means all sides come together
plane	-	flat, not three-dimensional
area	-	the amount of surface on a plane figure
parallel	-	nonintersecting lines of a plane
perimeter	-	measure of distance around any closed, plane figure
perpendicular	-	lines that meet to form right (or 90 degree) angles
right angle	-	a 90 degree angle
line segment	-	portion of line having a beginning and an end
rectangle	-	a four-sided figure with two pairs of parallel sides and four right (90 degree) angles; opposite sides are equal
square	-	a four-sided figure with two pairs of parallel sides, four right (90 degree) angles and four equal sides
triangle	-	a closed, plane figure with three sides; total of three angles inside the triangle total 180 degrees

LESSON METHODOLOGY:

The focus of this section is for students to understand the concepts of perimeter and area, and be able to substitute numbers into formulas to solve problems. Simplification will not be emphasized.

Review names of the most common shapes and draw on the blackboard: square, rectangle, and triangle.

Tell students the distance around a flat object is known as its perimeter. The symbol for perimeter is "P." Perimeter is measured in length units. To find the perimeter of a figure, add the length of the sides or use the perimeter formulas.

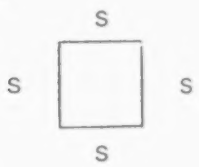
Give a definition for each figure, then show how the perimeter is computed using the sides.

SQUARE: A four-sided figure with two pairs of parallel sides, four right (90 degree) angles, and four equal sides.

$P = s + s + s + s$ The perimeter is the addition of the four sides:

or

$P = 4\,s$ The perimeter is four times the length of a side:



Example: What is the perimeter of a square that has a side 5 feet long?

Substitute 5 for "s " in the perimeter formula for a square.

$P = 4\,s$

$P = 4 \times 5$

$P = 20$

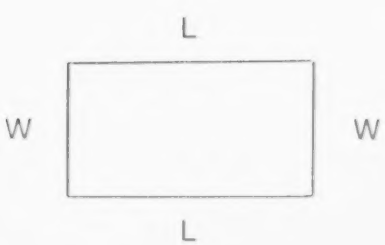
Answer: **P = 20 ft**

RECTANGLE: A four-sided figure with two pairs of parallel sides and four right (90 degree) angles.

$P = L + W + L + W$ The perimeter is the addition of two lengths and two widths (L stands for length, W stands for width)

or

$P = 2\,L + 2\,W$ The perimeter is the addition of twice the length plus twice the width.



Example: What is the perimeter of a rectangle that has a length of 5 feet and a width of 3 feet?

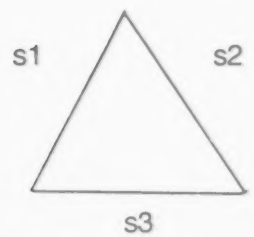
Substitute 5 for "L" and 3 for "W" in the perimeter formula for a rectangle.

$P = 2L + 2W$
$P = (2 \times 5) + (2 \times 3)$
$P = 10 + 6$
$P = 16$

Answer: **P = 16 ft**

TRIANGLE: A closed plane figure with three sides; the three angles inside a triangle total 180 degrees.

$P = s1 + s2 + s3$ The perimeter is the addition of all three sides.



Example: What is the perimeter of a triangle that has sides of 3 feet, 4 feet, and 5 feet.

Substitute 3 for "s1" , 4 for "s2" , and 5 for "s3" in the perimeter formula for a triangle.

$P = s1 + s2 + s3$
$P = 3 + 4 + 5$
$P = 12$

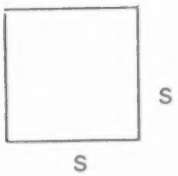
Answer: **P = 12 feet**

*Use Hand-outs: "Perimeter and Area - Practice 1"
"Perimeter and Area - Formulas"

Using hand-outs, have students compute the perimeters of various figures. Then proceed to introducing area.

Review the figures again. Explain that the area of common geometric figures is usually found by using an area formula. To use an area formula, substitute numbers for letters and then multiply or divide as needed.

SQUARE: $A = s^2$ The area is found by squaring a side (or multiplying the value of a side times itself.)



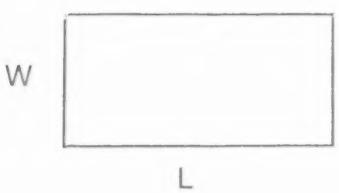
Example: What is the area of a square that has a side measuring 5 feet?

Substitute 5 for "s" in the area formula for a square.

$A = s^2$
$A = 5^2$
$A = 5 \times 5$
$A = 25$

Answer: **A = 25 ft ^{2} or 25 square feet**

RECTANGLE: $A = L \times W$ The area is found by multiplying the length times the width.



Example: What is the area of a rectangle that has a length of 5 feet and a width of 4 feet?

Substitute 5 for "L" and 4 for "W" in the area formula for a rectangle.

$A = L \times W$
$A = 5 \times 4$
$A = 20$

Answer: **A = 20 ft ^{2} or 20 square feet**

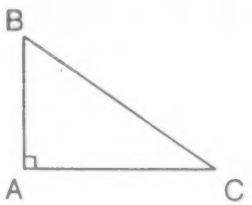
TRIANGLE: $A = \frac{1}{2} b h$ The area is found by multiplying one-half times the base times the height.

or

$A = \frac{b h}{2}$ The area is found by multiplying the base times the height then dividing by two.

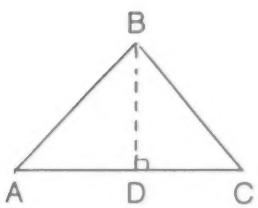
Note: When working with triangles, "base" and "height" are used instead of "length" and "width."

Triangle type 1:



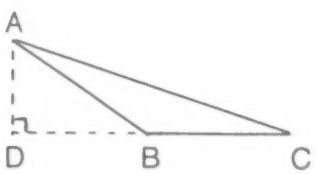
The base is the length of line AC.
The height is the length of line AB.

Triangle type 2:



The base is the length of line AC.
The height is the length of line BD.
(The height is not one of the sides of the triangle. The height BD is drawn in to show the distance between point B and the base AC. This line is perpendicular to the base.)

Triangle type 3:



The base is the length of line BC.
The height is the length of line AD.
(Since point A does not lie directly above the base BC, extend the base BC to point D. The height is line AD. This line is perpendicular to the base extension.)

Example: What is the area of a triangle with a base of 6 feet and a height of 4 feet?

Substitute 6 for "b" and 4 for "h" in the area formula for a triangle.

$A = \frac{1}{2} b h$

$A = \frac{1}{2} \times 6 \times 4$

$A = \frac{1}{2} \times 24$

$A = 12$

Answer: **A = 12 ft ^{2} or 12 square feet**

*Use Hand-outs: "Perimeter and Area - Practice 1"
"Perimeter and Area - Formulas"

Using hand-outs, have students compute the areas of various figures.

*Use Hand-out: "Perimeter and Area - Word Problems"

Using hand-out, have students work in groups to set up and solve word problems involving perimeter and area.

PERIMETER AND AREA
FORMULAS

P - PERIMETER: A - AREA s - SIDE

L - LENGTH W - WIDTH b - BASE

h - HEIGHT

NAME	PERIMETER	AREA
Square	$P = 4s$ *or* $P = s+s+s+s$	$A = s \times s$ *or* $A = s^2$
Rectangle	$P = 2L + 2W$ *or* $P = L+W+L+W$	$A = L \times W$
Triangle	$P = s1 + s2 + s3$	$A = \frac{1}{2} b h$ *or* $A = \frac{b h}{2}$

PERIMETER AND AREA
PRACTICE 1

Section A: PERIMETER

Substitute the numbers in the formula and solve. (It is not necessary to simplify.)

Square:	P = 4s	s = 8 ft		Answer_____
		s = 12 yd		Answer_____
		s = 3 in		Answer_____
Rectangle:	P = 2L + 2W	L = 5 ft	W = 2 ft	Answer_____
		L = 6 yd	W = 4 yd	Answer_____
		L = 8 in	W = 3 in	Answer_____
Triangle:	P = s1+s2+s3	s1 = 3 in s3 = 5 in	s2 = 4 in	Answer_____
		s1 = 4 ft s3 = 8 ft	s2 = 5 ft	Answer_____
		s1 = 2 yd s3 = 2 yd	s2 = 4 yd	Answer_____

Section B: AREA

Substitute the numbers in the formula and solve. (It is not necessary to simplify.)

Square:	$A = s^2$	s = 8 ft		Answer_____
		s = 12 yd		Answer_____
		s = 3 in		Answer_____
Rectangle:	A = L x W	L = 5 in	W = 2 in	Answer_____
		L = 6 yd	W = 4 yd	Answer_____
		L = 8 ft	W = 5 ft	Answer_____
Triangle:	$A = \frac{1}{2}$ bh	b = 4 in	h = 5 in	Answer_____
		b = 14 yd	h = 6 yd	Answer_____
		b = 3 ft	h = 6 ft	Answer_____

PERIMETER AND AREA
PRACTICE 1
ANSWER SHEET

Section A: PERIMETER

Substitute the numbers in the formula and solve. (It is not necessary to simplify.)

Square:	P = 4s	s = 8 ft		Answer *32 ft*
		s = 12 yd		Answer *48 yd*
		s = 3 in		Answer *12 in*
Rectangle:	P = 2L + 2W	L = 5 ft	W = 2 ft	Answer *14 ft*
		L = 6 yd	W = 4 yd	Answer *20 yd*
		L = 8 in	W = 3 in	Answer *22 in*
Triangle:	P = s1+s2+s3	s1 = 3 in s3 = 5 in	s2 = 4 in	Answer *12 in*
		s1 = 4 ft s3 = 8 ft	s2 = 5 ft	Answer *17 ft*
		s1 = 2 yd s3 = 2 yd	s2 = 4 yd	Answer *8 yd*

Section B: AREA

Substitute the numbers in the formula and solve. (It is not necessary to simplify.)

Square:	$A = s^2$	s = 8 ft		Answer *64 ft²*
		s = 12 yd		Answer *144 yd²*
		s = 3 in		Answer *9 in²*
Rectangle:	A = L x W	L = 5 in	W = 2 in	Answer *10 in²*
		L = 6 yd	W = 4 yd	Answer *24 yd²*
		L = 8 ft	W = 5 ft	Answer *40 ft²*
Triangle:	$A = \frac{1}{2}$ bh	b = 4 in	h = 5 in	Answer *10 in²*
		b = 14 yd	h = 6 yd	Answer *42 yd²*
		b = 3 ft	h = 6 ft	Answer *9 ft²*

42

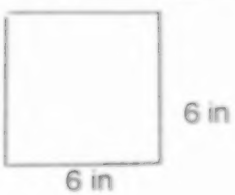
PERIMETER AND AREA
PRACTICE 1 page 2

Section C: MIXED REVIEW

Solve the following problems using the area and perimeter formulas. (It is not necessary to simplify.)

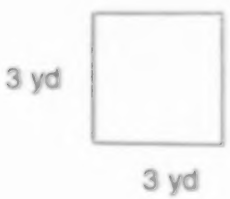
1. P = _____

   A = _____



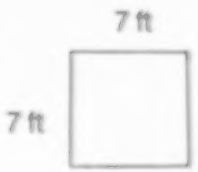
2. P = _____

   A = _____



3. P = _____

   A = _____



4. P = _____

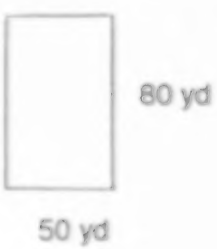
   A = _____

5. P = _____

   A = _____

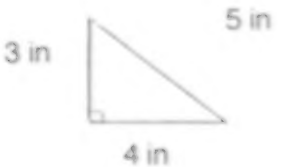
6. P = _____

   A = _____



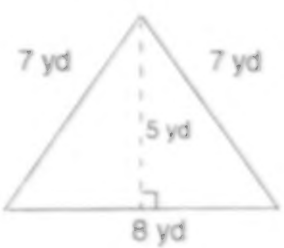
7. P = _____

   A = _____



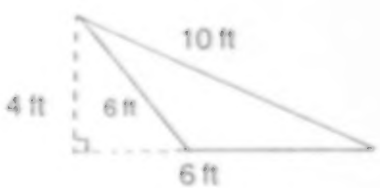
8. P = _____

   A = _____



9. P = _____

   A = _____



PERIMETER AND AREA

PRACTICE 1 page 2

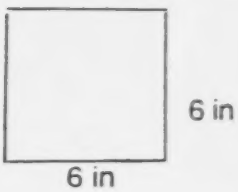
ANSWER SHEET

Section C: MIXED REVIEW

Solve the following problems using the area and perimeter formulas. (It is not necessary to simplify.)

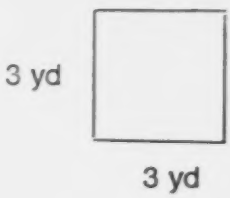
1. P = *24 in*

   A = *36 in²*



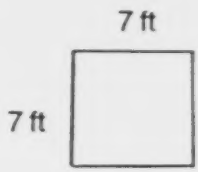
2. P = *12 yd*

   A = *9 yd²*



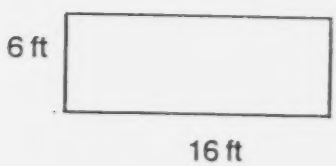
3. P = *28 ft*

   A = *49 ft²*



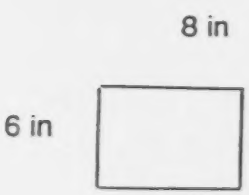
4. P = *44 ft*

   A = *96 ft²*



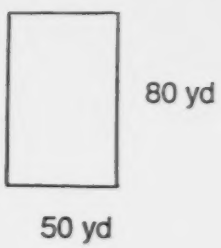
5. P = *28 in*

   A = *48 in²*



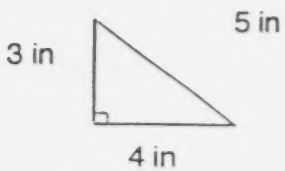
6. P = *260 yd*

   A = *4000 yd²*



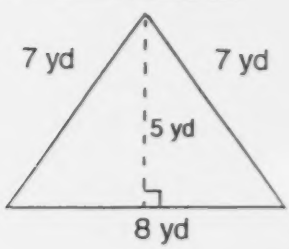
7. P = *12 in*

   A = *6 in²*



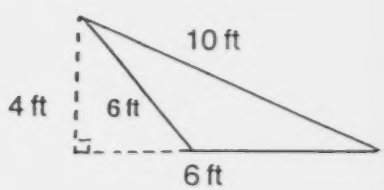
8. P = *22 yd*

   A = *20 yd²*



9. P = *22 ft*

   A = *12 ft²*



PERIMETER AND AREA
WORD PROBLEMS

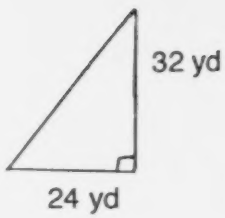
1. How many feet of fence material must John buy to surround a garden space that is in the shape of a square 15 feet on a side?

2. What is the perimeter of a bedroom floor that measures 5 yards long and 4 yards wide?

3. Determine the perimeter, in inches, of a triangle with the sides 17 inches, 18 inches, and 15 inches.

4. Rita wants to put lace around a triangular scarf that measures 29 inches on two sides and 45 inches on the other side. How much lace will she need?

5. Here is a diagram of a corner lot. What is the area?



6. Mary needs to cover a square flower bed with straw. The bed measures 6 feet on a side. How much area does Mary have to cover?

7. Marsha wants to carpet a family room which measures 26 feet by 18 feet. How many square feet will she need to carpet?

8. Albert plans to fertilize a rectangular lot that measures 14 yards by 35 yards. What is the total area he needs to cover?

PERIMETER AND AREA
WORD PROBLEMS
ANSWER SHEET

1. How many feet of fence material must John buy to surround a garden space that is in the shape of a square 15 feet on a side?

60 feet of fence material

2. What is the perimeter of a bedroom floor that measures 5 yards long and 4 yards wide?

18 yards

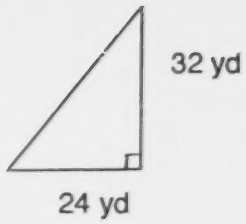
3. Determine the perimeter, in inches, of a triangle with the sides 17 inches, 18 inches, and 15 inches.

50 inches

4. Rita wants to put lace around a triangular scarf that measures 29 inches on two sides and 45 inches on the other side. How much lace will she need?

103 inches of lace

5. Here is a diagram of a corner lot. What is the area?



384 yd ^{2}

6. Mary needs to cover a square flower bed with straw. The bed measures 6 feet on a side. How much area does Mary have to cover?

36 ft ^{2}

7. Marsha wants to carpet a family room which measures 26 feet by 18 feet. How many square feet will she need to carpet?

468 ft ^{2}

8. Albert plans to fertilize a rectangular lot that measures 14 yards by 35 yards. What is the total area he needs to cover?

490 yd ^{2}

RATIO

AND

PROPORTION

RATIO & PROPORTION

OBJECTIVE:

To show relationship between numbers

RATIONALE:

In everyday situations, we must draw comparisons between quantities, objects and numbers. The use of ratio and proportions allow us to make these comparisons.

VOCABULARY:

ratio	-	a comparison of the number of objects in one group to the number of objects in another group
proportion	-	a statement that two ratios or two relationships are equal; a pair of equal fractions
cross multiplication	-	in a proportion, multiplying the numerator of one ratio with the denominator of the other to get cross products which are equal
variable	-	a letter used as a place holder for numerals; used to represent unknown or unspecified number

LESSON METHODOLOGY:

RATIO

Explain that a ratio is a comparison of two numbers. Always write the quantities in a ratio in the same order they appear in the problem. Label unlike quantities (amounts with different measurements).

Example: The ratio of three apples to two oranges = $\frac{3 \text{ apples}}{2 \text{ oranges}}$

The ratio of 5 hours to 3 hours = $\frac{5}{3}$

The ratio of 7 inches to 1 foot = $\frac{7}{12}$ (change 1 foot to 12 inches)

A ratio, like a fraction, is always reduced to lowest terms. However, a ratio that is written as an improper fraction does not need to be changed to a mixed number.

Example: Reduce the ratio of 10 to 4 to lowest terms.

(1) Write the ratio 10 to 4 as a fraction.

$$10 \text{ to } 4 = \frac{10}{4}$$

(2) Reduce the fraction $\frac{10}{4}$ to lowest terms.

$$\frac{10}{4} = \frac{10 \div 2}{4 \div 2} = \frac{5}{2}$$

Answer: $\mathbf{\frac{5}{2}}$

PROPORTION

In solving word problems you will frequently set up a proportion which has a letter in place of a number. This letter is called a variable.

Example: Solve for "n" in the following proportion $\frac{2}{5} = \frac{n}{20}$

To find "n", use the technique called cross multiplication.

$$\frac{2}{5} = \frac{n}{20} \qquad \frac{2}{5} \times \frac{n}{20}$$

(1) $5 \times n = 2 \times 20$

(2) $5n = 40$

(3) $\frac{5n}{5} = \frac{40}{5}$

Answer: $\mathbf{n = 8}$ $\qquad \frac{2}{5} = \frac{\mathbf{8}}{20}$

When we set up proportions in word problems, it is important to set up the proportion correctly. The known relationship should be the first ratio. The second ratio must follow the same pattern.

Example: If Greg can set up two sets of files in 10 working hours, how long will it take him to set up 25 sets of files?

(1) Set up the ratios.

$$\frac{\text{2 sets of files}}{\text{10 working hours}} = \frac{\text{25 sets of files}}{\text{? working hours}}$$

(2) Solve by using cross multiplication.
(use the letter "n" to represent "? working hours")

$$\frac{2}{10} = \frac{25}{n} \qquad \frac{2}{10} \times \frac{25}{n}$$

(3) $10 \times 25 = 2 \times n$

(4) $250 = 2n$

(5) $\frac{250}{2} = \frac{2n}{2}$

(6) **$125 = n$**

Answer: $\frac{\text{2 sets of files}}{\text{10 working hours}} = \frac{\text{25 sets of files}}{\textbf{125 working hours}}$

** Use Hand-out: "Ratio and Proportion - Practice 1"

Using hand-out have students divide into small groups to simplify ratios and solve for the missing term in each proportion.

** Use Hand-out: "Ratio and Proportion - Word Problems"

Using hand-out have students set up and solve word problems involving ratio and proportion.

RATIO & PROPORTION
PRACTICE

REMEMBER: A ratio is simply a comparison of two things by division. A ratio looks like a fraction.

Write a ratio for the given information, then simplify the ratio.

1. 14 to 21 _____
2. 6 to 90 _____
3. 24 to 800 _____
4. 18 to 3 _____
5. 36 to 96 _____
6. 16 balls to 32 children _____
7. 3 cats to 15 dogs _____
8. 90 miles to 3 gallons _____
9. $20 to 2 people _____
10. 27 people to 6 teams _____

Find the unknown number in each proportion. The unknown number may be represented by any letter (n, x, b, etc.).

1. $\frac{3}{4} = \frac{9}{n}$ _____
2. $\frac{30}{6} = \frac{b}{10}$ _____
3. $\frac{200}{500} = \frac{800}{x}$ _____
4. $\frac{7}{p} = \frac{5}{75}$ _____
5. $\frac{5}{11} = \frac{10}{w}$ _____
6. $\frac{x}{42} = \frac{3}{7}$ _____
7. $\frac{56}{6} = \frac{t}{9}$ _____
8. $\frac{2}{5} = \frac{c}{45}$ _____
9. $\frac{48}{9} = \frac{64}{y}$ _____
10. $\frac{k}{2} = \frac{520}{52}$ _____

WARM-UP: RATIO & PROPORTION

PRACTICE

ANSWER SHEET

REMEMBER: A ratio is simply a comparison of two things by division. A ratio looks like a fraction.

Write a ratio for the given information, then simplify the ratio.

1. 14 to 21 — $\frac{2}{3}$
2. 6 to 90 — $\frac{1}{15}$
3. 24 to 800 — $\frac{3}{100}$
4. 18 to 3 — $\frac{6}{1}$
5. 36 to 96 — $\frac{3}{8}$
6. 16 balls to 32 children — $\frac{1 \text{ ball}}{2 \text{ children}}$
7. 3 cats to 15 dogs — $\frac{1 \text{ cat}}{5 \text{ dogs}}$
8. 90 miles to 3 gallons — $\frac{30 \text{ miles}}{1 \text{ gallon}}$
9. $20 to 2 people — $\frac{\$ 10}{1 \text{ person}}$
10. 27 people to 6 teams — $\frac{9 \text{ people}}{2 \text{ teams}}$

Find the unknown number in each proportion. The unknown number may be represented by any letter (n, x, b, etc.).

1. $\frac{3}{4} = \frac{9}{n}$ — $n = 12$
2. $\frac{30}{6} = \frac{b}{10}$ — $b = 50$
3. $\frac{200}{500} = \frac{800}{x}$ — $x = 2000$
4. $\frac{7}{p} = \frac{5}{75}$ — $p = 105$
5. $\frac{5}{11} = \frac{10}{w}$ — $w = 22$
6. $\frac{x}{42} = \frac{3}{7}$ — $x = 18$
7. $\frac{56}{6} = \frac{t}{9}$ — $t = 84$
8. $\frac{2}{5} = \frac{c}{45}$ — $c = 18$
9. $\frac{48}{9} = \frac{64}{y}$ — $y = 12$
10. $\frac{k}{2} = \frac{520}{52}$ — $k = 20$

RATIO AND PROPORTION
WORD PROBLEMS

1. What is the ratio of 15 minutes to 1 hour?

2. Paul's baseball team won 12 games out of 18 games played. What is the ratio of games won to games played?

3. Mr. Smith makes $1400 a month. He pays $350 for rent. What is the ratio of Mr. Smith's rent to his monthly income?

4. It snowed 18 days out of 30 days in November. What is the ratio of snowy days to the total days in the month?

5. John earned $56 for 8 hours of work. What is the ratio of his earnings to the number of hours he worked?

6. Green Auto Sales sold 45 cars and 18 mini vans last month. What is the ratio of cars sold to the total number of vehicles sold?

7. If 4 bags of carrots weigh a total of 14 pounds, how much will 10 bags of carrots weigh?

8. John spent $1.50 for 2 hamburgers. How much will it cost for him to buy 9 hamburgers?

9. If Carly can drive 160 miles in 5 hours, how many miles can she drive in 8 hours?

10. Mrs. Hindman's math class can do 30 algebra problems in 15 minutes. How many minutes will it take them to do 12 problems?

RATIO AND PROPORTION
WORD PROBLEMS
ANSWER SHEET

1. What is the ratio of 15 minutes to 1 hour?

$$\frac{15}{60} = \frac{1}{4}$$

2. Paul's baseball team won 12 games out of 18 games played. What is the ratio of games won to games played?

$$\frac{12 \text{ games won}}{18 \text{ games played}} = \frac{2}{3}$$

3. Mr. Smith makes $1400 a month. He pays $400 for rent. What is the ratio of Mr. Smith's rent to his monthly income?

$$\frac{\$400}{\$1400} = \frac{2}{7}$$

4. It snowed 18 days out of 30 days in November. What is the ratio of snowy days to the total days in the month?

$$\frac{18 \text{ snowy days}}{30 \text{ days}} = \frac{3}{5}$$

5. John earned $56 for 8 hours of work. What is the ratio of his earnings to the number of hours he worked?

$$\frac{\$56}{8 \text{ hours}} = \frac{\$7}{1 \text{ hour}}$$

6. Green Auto Sales sold 45 cars and 18 mini vans last month. What is the ratio of cars sold to the total number of vehicles sold?

$$\frac{45 \text{ cars}}{63 \text{ vehicles}} = \frac{5 \text{ cars}}{7 \text{ vehicles}}$$

7. If 4 bags of carrots weigh a total of 14 pounds, how much will 10 bags of carrots weigh?

$$\frac{4 \text{ bags}}{14 \text{ pounds}} = \frac{10 \text{ bags}}{x}$$

$$x = 35 \text{ pounds}$$

8. John spent $1.50 for 2 hamburgers. How much will it cost for him to buy 9 hamburgers?

$$\frac{\$1.50}{2 \text{ hamburgers}} = \frac{x}{9 \text{ hamburgers}}$$

$$x = \$6.75$$

9. If Carly can drive 160 miles in 5 hours, how many miles can she drive in 8 hours?

$$\frac{160 \text{ miles}}{5 \text{ hours}} = \frac{x}{8 \text{ hours}}$$

$$x = 256 \text{ miles}$$

10. Mrs. Hindman's math class can do 30 algebra problems in 15 minutes. How many minutes will it take them to do 12 problems?

$$\frac{30 \text{ problems}}{15 \text{ minutes}} = \frac{12 \text{ problems}}{x}$$

$$x = 6 \text{ minutes}$$

PERCENTS

PERCENTS

OBJECTIVE:

To introduce a basic review of fractions and decimals as they relate to percents

RATIONALE:

Percents appear regularly in daily life and in math problems. Students may even want to know how their grades in class are determined. When 100 questions are used, percentage is easily determined. When more or less questions are asked, it becomes more difficult for students to compute the percentage grade of their tests or papers. Participants need to know the relationship between fractions and decimals, and their conversion to percents.

VOCABULARY:

percent	-	a part of a whole that is divided into one hundred parts
fraction	-	a piece of a whole; the group which includes mixed numbers, improper fractions and proper fractions
numerator	-	the top number in a fraction
denominator	-	the bottom number in a fraction
decimal	-	a number using base ten and containing a decimal point
%	-	a symbol that stands for percent

LESSON METHODOLOGY:

Introduce the word percent. Explain that the prefix, "per," means "each"; and the root word, "cent," comes from Latin and means "hundredth part."

Tell students that when figures must be compared, we use a percentage so that everyone can use the same common denominator. Percent is a common term in the everyday world. Interest, discounts, raises, paycheck deductions, and credit card charges are all figured with percents. 100 is a good base because it is found in fractions and decimals, and corresponds to the United States monetary system.

<u>CHANGING DECIMALS TO PERCENTS</u>

Decimals are easily converted to percents by simply moving the decimal point two places to the right and adding the percent symbol onto the end of the digits. If the point moves to the end of the number, it is not necessary to write the point. In a whole number, place the decimal point to the right of the number, then move two places to the right.

Examples:

Decimal		Move two places to the right		Percent
.025	=	025	=	2.5%
5	=	500	=	500%
.36	=	36	=	36%
8.4	=	8.40	=	840%

CHANGING FRACTIONS TO PERCENTS

Explain to students that all fractions can be changed to percents simply by changing the fraction to a decimal then changing the decimal to a percent.

To change a fraction to a decimal, first divide the numerator by the denominator.

Example: $\frac{3}{4}$ is the same as 3 *divided by* 4

$$\frac{3}{4} = 4\overline{)3.00} \quad .75$$

28

20

20

The result of this division will be the decimal we need. As in the first example, to convert a decimal to a percent, move the decimal point two places to the right and add the percent symbol after the digits.

Answer: $\frac{3}{4} = .75 = 75 = \mathbf{75\%}$

*Use Hand-out: "Percents - Practice 1"

Using hand-out, have the students convert the decimals and fractions to percents.

CHANGING PERCENTS TO DECIMALS

Percents are converted to decimals by dropping the percent symbol and moving the decimal point two places to the left. Add zeros when necessary to move the two places.

Examples:

Percent		Move two places to the left		Decimal
6%	=	.06	=	.06
15%	=	.15	=	.15
.06%	=	.0006	=	.0006
.9%	=	.009	=	.009
150%	=	1.50	=	1.50

CHANGING PERCENTS TO FRACTIONS

To change a percent to a fraction, write the percent as a fraction with 100 as the denominator.

METHOD 1
Examples:

Percent		Fraction		Reduced Fraction
75%	=	$\frac{75}{100}$	=	$\frac{3}{4}$
9%	=	$\frac{9}{100}$	=	$\frac{9}{100}$
20%	=	$\frac{20}{100}$	=	$\frac{1}{5}$

METHOD 2
Example:

$8\frac{1}{3}\%$ = $\frac{8\frac{1}{3}}{100}$ Write the percent as a fraction with 100 as the bottom number.

= $8\frac{1}{3} \div 100$ You can rewrite this fraction as a division problem.

$= \frac{25}{3} \div \frac{100}{1}$ Change the mixed number to an improper fraction.

$= \frac{25}{3} \times \frac{1}{100}$ Invert the divisor and multiply.

$= \frac{25}{300} = \mathbf{\frac{1}{12}}$ Reduce.

*Use Hand-out: "Percents - Practice 2"

Using hand-out have the students convert the percents to decimals and fractions.

FINDING A PERCENT OF A NUMBER

To find a percent of a number, change the percent to a decimal or to a fraction and multiply.

Find 25% of 40.

METHOD 1
Example:

25% = .25 Change the percent to a decimal.

```
   40
 x .25
 2 00
 8 00
10. 00
```

Multiply.

Answer: **25% of 40 = 10**

METHOD 2
Example: $25\% = \frac{1}{4}$ Change the percent to a fraction.

$\frac{1}{4} \times \frac{40}{1}$ Change whole number to a fraction and multiply.

$= \frac{40}{4} = \frac{10}{1} = 10$ Reduce.

Answer: **25% of 40 = 10**

*Use Hand-out: "Percents - Practice 3"

Using hand-out, have the students find the percent of numbers.

*Use Hand-out: "Percents - Word Problems"

Using hand-out, have students work in groups to set up and solve word problems involving percents.

PERCENTS
PRACTICE 1

Change each decimal to a percent:

1. .065 =
2. .75 =
3. 1.5 =
4. .02 =
5. 80 =
6. .32 =
7. .005 =
8. .0016 =
9. .085 =
10. .09 =
11. .372 =
12. .65 =
13. 7 =
14. .0003 =
15. .6 =
16. .025 =

Change each fraction to a percent:

1. $\frac{2}{5}$ =
2. $\frac{6}{25}$ =
3. $\frac{9}{10}$ =
4. $\frac{1}{10}$ =
5. $\frac{5}{8}$ =
6. $\frac{4}{25}$ =
7. $\frac{9}{20}$ =
8. $\frac{3}{15}$ =
9. $\frac{1}{4}$ =
10. $\frac{7}{8}$ =
11. $\frac{4}{5}$ =
12. $\frac{3}{10}$ =
13. $\frac{3}{5}$ =
14. $\frac{5}{12}$ =
15. $\frac{20}{50}$ =
16. $\frac{4}{16}$ =

PERCENTS
PRACTICE 1
ANSWER SHEET

Change each decimal to a percent:

1.	.065	=	*6.5%*	9.	.085	=	*8.5%*
2.	.75	=	*75%*	10.	.09	=	*9%*
3.	1.5	=	*150%*	11.	.372	=	*37.2%*
4.	.02	=	*2%*	12.	.65	=	*65%*
5.	80	=	*8000%*	13.	7	=	*7%*
6.	.32	=	*32%*	14.	.0003	=	*.03%*
7.	.005	=	*.5%*	15.	.6	=	*60%*
8.	.0016	=	*.16%*	16.	.025	=	*2.5%*

Change each fraction to a percent:

1.	$\frac{2}{5}$	=	*40%*	9.	$\frac{1}{4}$	=	*25%*
2.	$\frac{6}{25}$	=	*24%*	10.	$\frac{7}{8}$	=	*87.5%*
3.	$\frac{9}{10}$	=	*90%*	11.	$\frac{4}{5}$	=	*80%*
4.	$\frac{1}{10}$	=	*10%*	12.	$\frac{3}{10}$	=	*30%*
5.	$\frac{5}{8}$	=	*62.5%*	13.	$\frac{3}{5}$	=	*60%*
6.	$\frac{4}{25}$	=	*16%*	14.	$\frac{3}{4}$	=	*75%*
7.	$\frac{3}{20}$	=	*15%*	15.	$\frac{20}{50}$	=	*40%*
8.	$\frac{3}{15}$	=	*20%*	16.	$\frac{4}{16}$	=	*25%*

PERCENTS
PRACTICE 2

Change each percent to a decimal:

1. 60% =
2. 8% =
3. 35% =
4. 120% =
5. 95% =
6. 5% =
7. 21.6% =
8. .04% =
9. 37.5% =
10. 100% =
11. 75% =
12. 50% =
13. .5% =
14. 12.5% =
15. .44% =
16. 1% =

Change each percent to a fraction:

1. 6% =
2. 1% =
3. 20% =
4. 99% =
5. 4% =
6. $12\frac{1}{2}\%$ =
7. $37\frac{1}{2}\%$ =
8. $4\frac{1}{2}\%$ =
9. 35% =
10. 90% =
11. 12% =
12. 80% =
13. 59% =
14. $16\frac{2}{3}\%$ =
15. $33\frac{1}{3}\%$ =
16. $5\frac{1}{3}\%$ =

PERCENTS
PRACTICE 2
ANSWER SHEET

Change each percent to a decimal:

1. 60% = .6
2. 8% = .08
3. 35% = .35
4. 120% = 1.2
5. 95% = .95
6. 5% = .05
7. 21.6% = .216
8. .04% = .0004
9. 37.5% = .375
10. 100% = 1
11. 75% = .75
12. 50% = .5
13. .5% = .005
14. 12.5% = .125
15. .44% = .0044
16. 1% = .01

Change each percent to a fraction:

1. 6% = $\frac{3}{50}$
2. 1% = $\frac{1}{100}$
3. 20% = $\frac{1}{5}$
4. 99% = $\frac{99}{100}$
5. 4% = $\frac{1}{25}$
6. $12\frac{1}{2}\%$ = $\frac{1}{8}$
7. $37\frac{1}{2}\%$ = $\frac{3}{8}$
8. $4\frac{1}{2}\%$ = $\frac{9}{200}$
9. 35% = $\frac{7}{20}$
10. 90% = $\frac{9}{10}$
11. 12% = $\frac{3}{25}$
12. 80% = $\frac{4}{5}$
13. 59% = $\frac{59}{100}$
14. $16\frac{2}{3}\%$ = $\frac{1}{6}$
15. $33\frac{1}{3}\%$ = $\frac{1}{3}$
16. $5\frac{1}{3}\%$ = $\frac{4}{75}$

PERCENTS
PRACTICE 3

1. 80% of 65 =
2. 60% of 35 =
3. 125% of 60 =
4. 6.3 % of 300 =
5. 72% of 500 =
6. .4% of 200 =
7. .8% of 56 =
8. 24% of 150 =
9. 5% of 120 =
10. 25% of 36 =
11. 40% of 60 =
12. 35% of 480 =
13. 2.6% of 390 =
14. 7% of 965 =
15. 15% of 50 =
16. 10% of 780 =
17. $33\frac{1}{3}$% of 75 =
18. $6\frac{1}{4}$% of 400 =
19. $66\frac{2}{3}$% of 90 =
20. $1\frac{1}{2}$% of 200 =

PERCENTS
PRACTICE 3
ANSWER SHEET

1. 80% of 65 = *52*

2. 60% of 35 = *21*

3. 125% of 60 = *75*

4. 6.3 % of 300 = *18.9*

5. 72% of 500 = *360*

6. .4% of 200 = *8*

7. .8% of 56 = *4.48*

8. 24% of 150 = *36*

9. 5% of 120 = *6*

10. 25% of 36 = *9*

11. 40% of 60 = *24*

12. 35% of 480 = *168*

13. 2.6% of 390 = *10.14*

14. 7% of 965 = *67.55*

15. 15% of 50 = *7.5*

16. 10% of 780 = *78*

17. $33\frac{1}{3}$% of 75 = *25*

18. $6\frac{1}{4}$% of 400 = *25*

19. $66\frac{2}{3}$% of 90 = *60*

20. $1\frac{1}{2}$% of 200 = *3*

PERCENTS
WORD PROBLEMS

1. There are 24 actors in the community theater. If only 18 of them came one night, what percent of the actors was there?

2. The Walker family makes $360 a week. If they spend $90 each week for food, what percent of their income goes for food?

3. Todd got 36 problems correct out of a total of 40 problems on his test. What percent of the problems did he get correct?

4. Tony weighed 220 pounds. After one month of dieting and exercising, he lost 11 pounds. What percent of his weight did he lose?

5. If the sales tax in Pennsylvania is 6%, how much tax would you pay for a pen that costs $2.50?

6. 460 workers belong to the plumbers' union. If 65% of them went to the last meeting, how many members went to the meeting?

7. Rhonda's night class met every Monday night for 30 weeks. If she was absent from 20% of the classes, how many classes did she miss?

8. Jennifer gets a 15% discount on the price of clothing in the store where she works. How much will she save on a dress that costs $46?

PERCENTS
WORD PROBLEMS
ANSWER SHEET

1. There are 24 actors in the community theater. If only 18 of them came one night, what percent of the actors was there?

   75%

2. The Walker family makes $360 a week. If they spend $90 each week for food, what percent of their income goes for food?

   25%

3. Todd got 36 problems correct out of a total of 40 problems on his test. What percent of the problems did he get correct?

   90%

4. Tony weighed 220 pounds. After one month of dieting and exercising, he lost 11 pounds. What percent of his weight did he lose?

   5%

5. If the sales tax in Pennsylvania is 6%, how much tax would you pay for a pen that costs $2.50?

   $.15

6. 460 workers belong to the plumbers' union. If 65% of them went to the last meeting, how many members went to the meeting?

   299 members

7. Rhonda's night class met every Monday night for 30 weeks. If she was absent from 20% of the classes, how many classes did she miss?

   6 classes

8. Jennifer gets a 15% discount on the price of clothing in the store where she works. How much will she save on a dress that costs $46?

   $6.90

POST-TESTING

POST-TEST

1. Karen is making 6 flags for the summer festival. If she uses 4 feet 5 inches for each flag, how much material will she need?

   A. 8 yards 6 inches
   B. 8 yards 2 feet 6 inches
   C. 10 yards 1 foot 2 inches
   D. 10 yards 2 feet 11 inches
   E. none of these

2. The lamp post is 7 feet 6 inches high. How high is it in inches?

   A. 113 inches
   B. 90 inches
   C. 84 inches
   D. 76 inches
   E. none of these

3. Roy and Heidi won the dance marathon by dancing together for 840 minutes. How many hours did they dance?

   A. 14 hours
   B. 18 hours
   C. 24 hours
   D. 30 hours
   E. none of these

4. John has 12 yards of cord. If he needs to cut it into 9 equal pieces, how long will each piece be?

   A. 2 feet
   B. 3 feet
   C. 4 feet
   D. 5 feet
   E. none of these

5. For the science experiment, each group needs 2 cups of water. If there are 8 groups, how much water is needed?

   A. 4 quarts
   B. 6 quarts
   C. 8 quarts
   D. 10 quarts
   E. none of these

6. What is the perimeter in feet of a shed that is 8 feet long and 6 feet wide?

A. 28 feet
B. 38 feet
C. 48 feet
D. 58 feet
E. none of these

7. How many feet of fence is needed to go around a square garden that is 6 feet on each side?

A. 24 feet
B. 30 feet
C. 36 feet
D. 40 feet
E. none of these

8. Greg wants to buy a cover for his swimming pool. If the pool measures 25 feet by 15 feet, how many square feet will the cover need to be?

A. 40 square feet
B. 80 square feet
C. 125 square feet
D. 375 square feet
E. none of these

9. Mr. Jones needs to tape a triangular-shaped piece of poster board on the wall. If the poster board measures 8 inches by 12 inches by 12 inches, how much tape will he need to go around it?

A. 32 inches
B. 30 inches
C. 28 inches
D. 22 inches
E. none of these

10. If a square tarp measures 6 feet on each side, what is the area of the tarp?

A. 24 square feet
B. 30 square feet
C. 34 square feet
D. 40 square feet
E. none of these

11. What is the ratio of 8 inches to 1 foot?

A. $\frac{2}{3}$

B. $\frac{3}{2}$

C. $\frac{4}{1}$

D. $\frac{1}{4}$

E. none of these

12. What is the ratio of 18 hours to 1 day?

A. $\frac{4}{3}$

B. $\frac{1}{2}$

C. $\frac{3}{4}$

D. $\frac{2}{1}$

E. none of these

13. In Mrs. Moore's fifth grade class of 25 students, 15 are boys. What is the ratio of boys to girls?

A. $\frac{3 \text{ boys}}{2 \text{ girls}}$

B. $\frac{2 \text{ boys}}{3 \text{ girls}}$

C. $\frac{3 \text{ boys}}{5 \text{ girls}}$

D. $\frac{5 \text{ boys}}{3 \text{ girls}}$

E. none of these

14. The directions on the drink concentrate say to mix 1/2 cup of concentrate with 4 cups of water. How much water is needed if 1 1/2 cups of concentrate are used?

A. 6 cups of water
B. 8 cups of water
C. 10 cups of water
D. 12 cups of water
E. none of these

15. If 6 pens cost $1.50, how much does 1 pen cost?

A. $.23
B. $.25
C. $.27
D. $.29
E. none of these

16. 40% of the books in the store are nonfiction. If there are 1,345 books in the store, how many books are nonfiction?

A. 494 books
B. 504 books
C. 514 books
D. 524 books
E. none of these

17. The coats on the rack were on sale for 30% off the regular price. What would the sale price be for a $200 coat?

A. $120
B. $135
C. $150
D. $170
E. none of these

18. Bill bought a blanket costing $18.40. If he was charged 5% sales tax, what was his total cost?

A. $18.92
B. $19.32
C. $19.52
D. $19.72
E. none of these

19. If 6 out of 24 students have blue eyes, what percent of students have blue eyes?

A. 20%
B. 25%
C. 30%
D. 35%
E. none of these

20. Sharon's grocery store bill was $50. If she spent $10 on meat, what percent of her bill was for meat?

A. 17%
B. 20%
C. 25%
D. 28%
E. none of these

BONUS

1. If 2 out of every 3 dogs at the pound are wearing collars, how many of the 18 dogs are wearing collars?

A. 10 dogs
B. 11 dogs
C. 12 dogs
D. 13 dogs
E. none of these

2. The bicycle factory went 112 days without an accident. How many weeks would this be?

A. 16 weeks
B. 17 weeks
C. 18 weeks
D. 19 weeks
E. none of these

3. Jim cut a piece of plywood into the shape of a triangle. Find the area of the triangle if the base measures 8 feet and the height measures 6 feet.

A. 14 square feet
B. 24 square feet
C. 36 square feet
D. 48 square feet
E. none of these

NAME_____

DATE _____

POST-TEST ANSWER SHEET

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

BONUS

1. _____
2. _____
3. _____

NAME_____

DATE _____

POST-TEST ANSWER SHEET

1. B
2. B
3. A
4. C
5. A
6. A
7. A
8. D
9. A
10. E
11. A
12. C
13. A
14. D
15. B
16. E
17. E
18. B
19. B
20. B

BONUS

1. C
2. A
3. B

APPENDIX

CREDITS

CREDITS

Administration:

Dr. Nancy Robbins, Ex. Dir.
Central Intermediate Unit 10
R. R. 1, Box 374
West Decatur, PA 16878

Edith A. Gordon
CIU 10 Development Center
for Adults
Centre County Vo-Tech School
Pleasant Gap, PA 16823

Budget and Technical Assistance:

Melanie Haley
JoEllen Bloom
CIU 10 Development Center
for Adults
410 Shaw Street
Clearfield, PA 16830

Karen Wolfe
CIU 10 Development Center
for Adults
Centre County Vo-Tech School
Pleasant Gap, PA 16823

New Choices:

Judy A. Davis, Director
New Choices
CIU 10 Development Center
for Adults
410 Shaw Street
Clearfield, PA 16830

Members of the 1994-95
New Choices Classes

BIBLIOGRAPHY

BIBLIOGRAPHY

Gafney, Leo and Beers, John C. Essential Math Skills: A Mathematics Competency Workbook. New York: Phoenix Learning Resources, 1990.

Howett, Jerry. GED Mathematics. Chicago: Contemporary Books, Inc., 1989.

Howett, Jerry. Number Power 2: Fractions, Decimals and Percents. Chicago: Contemporary Books, Inc., 1988.

Mitchell, Robert. Number Power 3: Algebra. Chicago: Contemporary Books, Inc., 1983.

Mitchell, Robert and Prickel, Donald. Number Power 4: Geometry. Chicago: Contemporary Books, Inc., 1984.

Tamarkin, Kenneth. Number Power 6: Word Problems. Chicago: Contemporary Books, Inc., 1983.